





















HAND-BOOK  
OF THE  
STATE OF GEORGIA  
" Dept. of Agri.

ACCOMPANIED BY A  
GEOLOGICAL MAP OF THE STATE.

PREPARED UNDER THE DIRECTION OF  
THOMAS P. JANES, A.M., M.D.,

*Commissioner of Agriculture of the State of Georgia.*

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STATE OF GEORGIA,  
*Department of Agriculture.* }  
ATLANTA, Nov. 26, 1876. }

THE law creating this Department (see page 211) requires the Commissioner to prepare, under his direction, a Hand-Book of the State, and specifies that it shall contain a description of the geological formation of the various Counties of the State, the general adaptation of the Soil for the various productions of the Temperate Zone, and for the purpose of giving a more general and careful estimate of the capacity and character of the soil of the Counties, with a correct analysis of the same.

These special features, thus required, in addition to the usual contents of a Hand-Book, can not be fully furnished until the State Geologist shall have completed his survey.

The outline of the geological and physical features of the State, with a description of the principal Rocks and the Soils derived from them, a description and analysis of some of the Marls, the Elevations, Water-powers, and a partial account of the Natural Productions of the State, both mineral and vegetable, are furnished by Dr. George Little, State Geologist, in charge of the Geological Survey now in progress.

In the preparation of this Hand-Book, two objects have been kept constantly in view:

1. To supply the people of Georgia with correct information of their own State, its condition, resources, and institutions.
2. To supply Immigrants, actual and prospective, with accurate and reliable information on those subjects connected with Georgia in which it is believed they will feel a special interest.

The facts in regard to the various Institutions of the State have been furnished mainly by their officers or representatives. It has been necessary to omit much interesting and valuable information, on account of the numerous subjects to be presented, and to prevent swelling the volume to too great a size.

THOMAS P. JANES,  
*Commissioner of Agriculture.*



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## INTRODUCTORY.



### AGE OF THE STATE AND ITS SETTLEMENT.

THE American Union is the fourth in rank of the great land-owners of the globe, covering a territory of 3,600,000 square miles—nearly equal to the whole of Europe. It is composed of 48 political divisions, quite unequal in size and population, of which 38 are States, with an average population of 1,200,000 souls, and an average area of 52,000 square miles—a little larger than England proper.

This large territory was gradually acquired. The Union began in 1776, with an area of 827,844 square miles, of which 420,892 were in the States, and 406,952 without them. The French cession of Louisiana in 1803 more than doubled the territory by adding 1,117,931 square miles, at a cost of \$23,500,000. In 1819, Florida was acquired from Spain; Texas was annexed in 1845; California and New Mexico in 1848; the Gadsden purchase from Mexico in 1852; and, finally, Alaska in 1867. The unoccupied portions of the original States were gradually ceded to the Union by the States.

The acquisition of territory was gradual, and the process of peopling it was slower. Of the centuries (not yet four) since the discovery of America, more than one full century had elapsed before the first permanent settlement in the United States was made—that of Virginia in the year 1607—115 years after Columbus crossed the ocean. Before the colonization of South Carolina in 1670, the first settlers of Virginia had grown gray, and a like interval after this elapsed before the settle-

ment of Georgia in 1732. The first infant born in Charleston had reached the age of threescore before Oglethorpe landed at Savannah and founded Georgia—the youngest Colony of the original thirteen. Virginia, then at the age of 127, was almost as old as Georgia is now, at the age of 144. So gradual is the conquest of space.

Tempting as the New World seemed in so many ways, centuries had not sufficed to people it. The United States, with all her vast area and unexampled growth, had not attained in 1860 a population equal to that of Japan, with an area about equal to half of Texas. In 1870, with 11 souls to the square mile, it was less densely peopled by half than the average land surface of the globe, including deserts and all uninhabitable places—the latter average being 27 souls. Distance, poverty, the ocean, the forest, the Indian—all stood between the European and the New World; even when he reached it and made good his footing, disease, hunger, and hardship were for a long time his attendants. Stringent motives were necessary to induce men to encounter the hardships of pioneer life. Among these motives, Religion, Poverty, and Crime had the leading shares.

An adventurous disposition added its quota to the people of the colonies; but a sturdy and vigorous character was evinced by the choice of such a life; and among the numerous perils which cut off the new colonies, “the survival of the fittest” was constantly illustrated.

In the settlement of Georgia, there were two leading aims: 1. The new Colony was intended largely as a sort of buffer to South Carolina, to keep off the hostile Indian tribes; 2. To furnish a refuge to the poor people of Great Britain especially, though not excluding Europe generally.

Her beginnings were humble. Like John Bunyan, she was of an inconsiderable generation. The first colonists proved a failure, and better material was found in the immigration of the Salzburgers, the Moravians, and Scotch Highlanders.

Yet the character of the early colonists is more a matter of interest historically than by reason of any permanent influence they exerted on the future of the State. By far the largest and most influential element came from the other and older colonies—Virginia and the Carolinas. The moulding influence

which formed the present Georgia was derived from this internal immigration.

Georgia is usually referred to as the youngest of the original thirteen. The word *youngest* seems to be associated with her age ; but she is fairly to be classed among the older States of the Union. Compare 1676, 1776, 1876. In 1676, all the original colonies except Georgia were fairly under way. In 1776, Georgia was 44 years old, and no new State was admitted till 1791, after the Revolutionary War. There are 25 States younger than Georgia, and but half that number older. The late war, however, has practically made of the whole South new States.

The settlement of the State was a work of time, patience, and hardship. Not until a century after the first colonization, was the final acquisition of her territory from the Indians effected—the Cherokee Country, one of the finest and most populous portions of the State.

Before entering upon details, we will give a summary of the present condition of Georgia.

#### GENERAL VIEW OF THE SITUATION AND CONDITION OF THE STATE.

Georgia is admirably situated, with a fine ocean front on the South Atlantic coast—Savannah and Brunswick furnishing its chief ports for external commerce. It has several rivers emptying into the ocean and the Gulf of Mexico, which furnish considerable (yet not the best) facilities for inland navigation. The State in all sections is well wooded and watered. The climate is fine for production, health, and comfort. There is of soil, a great diversity, from very poor to very rich, and a remarkable range of agricultural production, embracing both provision and money crops, including among them Cotton, Rice, and Sugar, with all the cereals and grasses, and an immense variety of fruits and vegetables.

The territorial dimensions of the State are ample—the area exceeding 58,000 square miles, with an average length of 300 and breadth of 200 miles. The population, however, is rather sparse, being about the average of that of the organized States of the Union—say 22 per square mile. In 1870, the number

of inhabitants was 1,184,109, of whom 638,926 were whites and 545,183 blacks.

The State is divided by nature into three great divisions—Upper, Middle, and Lower Georgia—terms in this case equally applicable to latitude and altitude—the altitude rising with the latitude.

The wealth of Georgia in 1860 was relatively large—the aggregate being \$645,895,237—nearly \$1,100 to each white inhabitant. In 1870, five years after the war, the aggregate was reduced to \$268,169,207, being \$420 to each white, or \$268 to each inhabitant. The State debt until recently was far less than the value of the public property of the State, and probably does not now exceed it.

About 2,400 miles of railway are in operation, being one mile to every 28 square miles of territory, and one mile to every 500 inhabitants.

There is a newly organized system of public schools. The State University was founded in 1801. It is well patronized, and has a fair endowment. There are several denominational and other colleges, male and female.

The Capital of the State is Atlanta, a rapidly growing city of about 35,000 inhabitants. The civil divisions are: 137 Counties, 44 State Senatorial Districts, 9 Congressional Districts, and 20 Judicial Circuits.

Before the war, Georgia was generally regarded one of the most prosperous States of the Union; and since its close has been one of the most rapid of the Southern States in recuperation, and has ever enjoyed a high reputation for independence, vigor, and enterprise. Such is a very brief, general outline of the State.

A huge and complex thing is a State! In this one comprehensive word, what an aggregate is involved of objects natural and social—of land and water, forest and plain, cultivated fields and waste places, climate and soil; and of yet greater things—people and their ways, constitutions and institutions, laws and customs—all expressed in one short syllable! To obtain information concerning it requires considerable machinery to collect and arrange the facts of its condition. They are gathered from afar and brought together by means of statistics, which has lately grown up into a science.

Formerly it was employed almost entirely for taxation, representation, and war ; now for public information and guidance, to provide material for statesmanship and wise administration, and for individual conduct and popular improvement.

Only gradually have men worked into the idea that a State is a species of organism, of which the very units—men—are, themselves, the most complex of organisms ; and the relations of the units also, numerous and complex. Properly to represent the whole of the information is to combine the results of the laborers in each department—the historian, geographer, naturalist, statistician, etc. To do this well requires order and co-ordination, and an interlacing of dependent parts, to enable readers to grasp the whole, by grouping condensed and related statements in brief ; for one may know many facts, and yet have a confused idea of the whole.

The present work is intended to embrace three main topics of discussion, or general subjects to be treated : 1. The Country ; 2. The People ; 3. The Productions. These naturally and obviously cover the case. The Country—all things natural ; the People—all things social ; the Productions—the use of the country by the people.

The most important and practical subject for consideration is the actual development of Georgia, individual and social—that of the social units and the social aggregate—a correct view of our actual stage of progress.

In no respect are Georgia's advantages more conspicuous than in the admirable fitness of many portions of the State for *ample home comfort*.

The range of agricultural productions is remarkable for the following reasons : We reach nearly to the tropics. Our greatest length is from south to north, and the altitude increases with the latitude, thus supplying all the conditions of variety. From the semi-tropical products at the South, we pass above the cotton-belt in the mountain region. At the South, Rice Cane and Cotton are field crops, and the Orange and Banana are just reached, among tropical fruits. As we go higher, Cotton is the leading money crop, and we reach the favorite region of the Peach in all its lusciousness. The Pear can be grown everywhere, even to the southern limit, in its greatest perfection. At the Pomological Fair in Boston, it

was a Georgia Pear which took the highest premium, competing with those from California and the whole country. With proper judgment and skill, a Georgia farmer should be one of the best off in the Union for wealth and comfort, having abundant supplies and money crops also. The Cereals—especially of Wheat and Indian Corn—as shown by chemical analysis, cannot be surpassed in nutritive value. Of vegetables, the variety is almost unbounded, including all those named in the Gardens' Calendars—the Sweet-potato, Green Corn, and Okra of a superior sort, added. We have Figs, Pomegranates, Grapes, Muscadines, Apricots, Melons, Quinces and Plums. Apples flourish in all parts of the State except near the coast. All the fruits are of superior flavor. Wild fruits, including Strawberries, Blackberries, Grapes, and Nuts, are abundant. Nowhere does a greater variety repay the pains of the husbandman.

The mineral wealth of the State is large. Unsurpassed manufacturing facilities—water-power, coal, iron, cotton—all together. This interest is beginning rapidly to develop.

Another remarkable and unappreciated fact is found in the splendid commercial situation of Georgia. Naturally, and upon a normal development and growth of commerce, she has the finest commercial situation on the continent.

There are geographical and topographical considerations establishing this fact, which we will hereafter consider. A great commercial future may yet be hers, for it is not too late for the needful improvement.

Finally, there are here the most splendid opportunities for diversification of labor—the needed condition of material prosperity.

All the great industries can be fully represented: Agriculture, in its best phases, for profit and comfort; Manufacturing and Mining under the most favorable conditions; and Commerce, including not only her own exchanges, but a remarkable proportion of those of other sections of the country. These industries developed will give rise to professional employment also—thus covering the entire range of the industries of a prosperous people.

## EFFECTS OF THE LATE WAR BETWEEN THE STATES.

The prodigious retarding effect of the war is to be observed as one of the great elements which it will require time to overcome. We went foot. We are now spelling up slowly. Population and wealth were both set back, and the relations of all business undermined and revolutionized. One has well remarked that we lost our *very business habits*, besides our occupation.

The wealth of Georgia in 1870 was returned as 20 per cent less than in 1850—20 years before. In 1850, she was the 6th State in the Union in wealth, the 9th in population, and the 13th in white population. In 1870, she was the 20th in wealth. No study of any Southern State can be thorough which fails to recognize and examine this huge factor which divides the Old and New South.

The changes produced in Georgia by the war were as follows :

Population in 1850, 906,185.

“ “ 1860, 1,136,692—increase, 230,507, or 25.43 per cent.

“ “ 1870, 1,184,109 “ 47,417, “ 4 “ “

At the former rate, the increase in 1870 would have been 288,720, instead of 47,417, making a loss of 241,303, by virtue of the 4 years' war, or 60,326 per annum, of persons actually lost by the war and the increase of population prevented—the former being the most active and valuable men of the community, conducting its main business. This throws some light on the losses by the war.

The pecuniary losses were as follows. - The wealth of Georgia was :

In 1850, \$335,426,000.

“ 1860, 645,895,000—increase, \$310,469,000, or 90 per cent.

“ 1870, 268,169,000—decrease, 377,726,000, “ 58.5 “ “

At the former rate, the increase would have been 90 per cent—\$581,305,000, making the wealth of 1870, \$1,227,200,000; real wealth, \$268,169,000; loss, \$959,031,000. The loss was more than three times as great as the property left; and the estimate, at that, in greenbacks, not in gold.

The decennial tendency, moreover, was decidedly upward every successive decade ; so that the probable increase from 1860 to 1870, aside from the war, would have exceeded the foregoing ratio, and did exceed it at the North, in spite of the war.

The losses by the war have been equivalent to about 7 years' loss of increase in population, and 25 years' loss of wealth, besides the loss of business habits and the disorganization of industry.

The effect of all this is to make the Southern States generally—Georgia included—new States, now in their infancy, and have a new development.

This carries us forward into a general

#### VIEW OF THE FUTURE.

Set back 25 years in the race, we must look forward to a correspondingly long period for a new development—remembering, too, that the relative progress of other States will have been going on in geometrical progression.

But notwithstanding these discouraging circumstances, the future of the State, if no untoward event again occurs to check our natural progress, is full of hope. The progress already made by ourselves, with our own means, gives unmistakable assurance that we will, at no distant day, become opulent as a people and have a grand development of our State. Georgia will come to be known, not merely as an Agricultural, but as a Manufacturing State. Manufacturing Capital will come to the Cotton-fields, and with it will come denser population, greater general wealth, and higher organization. Her Mining resources will be developed—Gold, Coal, Iron, Lime, etc., etc.—also her immense natural advantages of commercial situation. Middle and Upper Georgia will be sought for the climate as well as for other advantages, and will have a largely increased white population.

Georgia has the greatest diversity of resources and powers of adaptation, and is recognized as the Empire State of the South. Her career is in the future. Her great hope is in her own people. Mr. John C. Reed, in his book, *The Old and the New South*, says : “The best inheritance of the New

from the Old South is the Southern people. . . . There is a great residuum of progressive energy, of intellectual strength, and moral worth in the people of the Southern States. They need not fear a comparison . . . with the most enlightened communities. Great men . . . such as the South have given birth to, in unbroken succession, are the unmistakable signs of a great people. . . . The rank and file of the Confederate armies have given proof that the men of the South must be classed, in all the elements of complete character, with the best that the world has ever seen. . . . Crime (before the war) was so infrequent that a single morning of the term of a rural court, nearly always sufficed to dispose of every indictment ; there was little want or pauperism ; virtue was everywhere the rule in private life, and there was seldom even the suspicion of corruption in government or the administration of justice. The history of this people since the war shows that they are possessed of the best Anglo-Saxon mettle."

It is the character of a people which constitutes a State, and in this we have abiding confidence. Not crushed by loss, Georgians are still full of pluck and energy, and think not of succumbing, but only of how to meet the new exigencies. Their resources are great in versatility and power of accommodation, and a proper use of their natural advantages will make them a noteworthy people.

#### IMMIGRATION.

Georgia presents to immigrants a splendid combination of advantages, natural and social. Many of them are common to the Southern States and some to the Cotton States only ; while others are peculiar to Georgia. So numerous and substantial are these advantages and inducements, as only to stand in need of appreciation to lead to large immigration. They will bear, too, the most attentive study. Few countries can bear so systematic a treatment and so rigorous an appeal to first principles, by a direct comparison, instituted and carried out between

## THE WANTS OF MAN AND THE MEANS OF SUPPLY.

Take all human wants, thoughtfully considered, and compare them *seriatim* with the provisions here made for their supply.

Bastiat, the French philosopher, sums up the wants of man substantially as follows, beginning with the simplest and advancing to the more complex and artificial: Air, Food, Clothing, Lodging, Health, Locomotion, Sense of Security, Instruction, Diversion, Sense of the Beautiful. Some of these wants are gratified by nature, some by society, and some by the combined action of both. Accepting this summary, compare, in Georgia, the supply provided:

1. *Air*.—Let the air be regarded in a wider sense as the synonym of climate. It is balmy, delicious, and wholesome. It has been said that no finer climate than that of Middle Georgia is enjoyed by any English-speaking people—and they hold one fourth of the habitable globe, scattered over every quarter. Take it year in and year out, it is only surpassed in comfort by some of the “table-land” regions, which, by way of compensation, lack variety. There is, especially in the Southern autumnal season and the Indian Summer, an indescribable charm, a sense of delicious repose, which makes existence itself an enjoyment. Of many a day, it may be said, “This is a gem—a perfect chrysolite!” With its balmy breath and its absolute freedom from every sense of oppression or exaction, it suits one, even as Sancho Panza said of sleep: it fits him all over like a garment.

2. *Food*.—Nowhere can be grown a greater variety of wholesome and delicious food. The range of food crops for man and beast is unsurpassed. The cereals in their perfection, show both to the taste and to chemical analysis a superior composition, quality, and flavor; “Corn bread,” North and South, is not the same thing; Sugar-cane, Rice, and Field Peas and vegetables of the most varied sort; the Sweet-Potato through the entire winter and summer—enough of itself to tempt an epicure—substantial and delicious. At a county fair held in November, a gentleman well known to the country sent from his garden for exhibition 24 varieties of vegetables; and this entirely without special preparation. Fruits of the finest flavor, and in abundance. And such

Peaches ! and, what is not generally supposed, such Pears ! Apples, Plums—domestic and wild ; Strawberries ; Raspberries—the flavor of Peaches and Strawberries surpassingly fine. The Figs, after all, regarded by many as the finest fruit we have, abundant, perfectly wholesome, and covering a long season. The Scuppernong Grape is a like resource.

For animal food, aside from game and fish, there is no country better adapted to the cheap production of the best meats. Beef—perhaps not quite so cheaply raised at present as in the blue-grass region—may still be had in abundance. So with Mutton, Pork, and Poultry. A large part of the time the animals producing these, can, to a great extent, “find themselves.” With our brief winters and light snow, the stock on a farm is largely self-supporting, and no one need want for meat, or for having it fresh the year round. Nowhere can Poultry be raised better or cheaper, and our dairy facilities, though poorly utilized, are unsurpassed.

In a word, for food-raising we are admirably situated ; nor do we ourselves half appreciate our advantages for abundance and variety of choice food.

3. *Clothing*.—The South is the home of Cotton—the choicest of clothing material. It may be equally so of Wool. It is capable of Flax and Silk ; and has the best natural facilities for manufacturing all these after their production. In this respect, Georgia is unsurpassed.

4. *Lodging*.—There is abundant material, well diffused, for housebuilding, of whatever sort, from the humble and quickly reared cabin to the stateliest mansion. Wood, Brick, Stone, Marble, Slate—material for sills, and plank and shingles—the pine and cypress—abundant. Material for all furniture, for comfort and luxury, abounds.

5. *Health*.—No greater errors abound abroad than on this subject. Life Insurance Companies have discriminated against some of the healthiest regions of the globe. The character of sickness at the North and South differs ; but the general health at the South and the rates of mortality will compare favorably with that of the North.

The conditions of health are perhaps more manageable. Certain low or swampy tracts at the South have given a false impression as to the general and pervading salubrity of the

climate. These places are well known and avoidable ; while at the North an all-pervading tendency—say to consumption—cannot be easily escaped. From this disease, the health maps in the Census Atlas show that we have an unusual exemption, especially in lower Georgia. This is also true of the mountain region. In Rabun County, a death from consumption has never been known to occur. The softness of our winters is greatly promotive of longevity.

6. *Locomotion*.—The impediments to this are greatest in a cold country—winter-locked, ice-bound ; or in a tropical country having an excess of heat and rain. In our moderate and delightful climate, comfortable indoors or out, little restraint arises either from heat or cold, snow or ice, or any natural cause. In summer and winter, spring and autumn, ground and water are alike open for use. The air in winter is cold enough for exhilaration, but generally not chilling and repressive. In the autumn, it is a luxury to move in it, and breathe it in. In the summer, sunstrokes seldom ever occur under any circumstances, while they are frequent in more northern latitudes. In summer, the days are shorter and the nights longer. Nowhere can a pleasanter out-door life be found, for the agriculturist whose duties require it, or for the sportsman or pleasure-seeker.

The character of the soil and surface in Southern Georgia admits of admirable and easily made roads. In the undulating country, they cost more, but there is more variety to invite out into the air and sunshine.

7. *A Sense of Security*.—Of this sense against molestation by the seasons or natural causes, we have already treated. It is also necessary against social injuries by law or by fellow-men. Here, too, serious misapprehensions prevail. There is an idea of violence and disorder in Southern society. The statistics of crime, like those of health, do not sustain this view ; and this error, too, has arisen from local and casual disturbances, seldom witnessed, much magnified, and concerning which there is really no practical feeling of apprehension. Indeed, the actual state of Southern society—its quiescence, freedom from danger of outbreaks, combinations, strikes, etc.—is just the contrary. The relation between the white people and the negroes is the most amiable which ever existed between

two races so far asunder in external characteristics, cultivation, development of brain, and with like surroundings. No outbreaks occurred during the war. The supposed volcano upon which we lived gave forth no eruption and caused no earthquakes. Considering the fearful tendencies and the bad management, the difficulties at an early period after the war were few and inconsiderable. Nowhere do a larger proportion of the population sleep without locks on their doors than in Georgia and the South generally, fearless both of violence and theft.

8. *Instruction*.—This, in some sections of Georgia, for some years longer, must depend largely on parents and the habits of the individual. For abundant school advantages, a certain density of population is necessary, and the want of this presents the only difficulty. The needful conditions improve with the increase of population, and as we regain our wealth and prosperity.

9. *Diversion* could not be omitted from a Frenchman's catalogue of needs, nor could a *Sense of the Beautiful*. So far as nature goes, variety gratifies both, and we have that of season and climate, of soil and surface, plants and trees, of sky and sunsets, of mountains and plains. For a natural sense of the Beautiful, we have both grand and quiet scenery. The country beautiful enough in itself, but upon which, if the expense devoted to many others had been bestowed, it would indeed be an earthly paradise.

Every charm of cultivation, of flowers and shrubbery, can be added with less cost than in most climates.

Of the Southern people, it may be truly said that they are a hospitable people, friendly to strangers and given to hospitality; and a foreigner with ordinary prudence will not find them otherwise. If he exhibit good sense and good feeling, he will soon have numerous and attached friends.

To one other want we shall refer—viz., Money. This is the means of procuring, by exchange, those things which money will supply, though not all of the foregoing wants. For making money or the things money will buy—its full equivalent in comfort—the South presents excellent opportunities to those who have skill or capital, or both. Like all other countries, it is subject to "hard times," but no family

need ever know want. Agriculturally, it has the best of money crops—Cotton, if not abused. For Manufacturing, it presents the finest opening to be found in the world. For Mining industry, also fine facilities. For Trade, good inducements to those who have capital. For Professional work, it is not yet so ripe.

Various conveniences and appliances, also, are necessary, such as Roads, Railroads, Churches, Schools, Court-Houses, and the machinery of Justice and Law. In these respects the advantages over a new country are world-wide. The roughness of a pioneer life is over, and the advantages of a social and industrial progress already attained. There is land cleared yet woodland convenient, railroad facilities ample for the present and for many years to come, a settled state of society, churches to go to, schools for children, laws established.

It is difficult to convey a full idea of the presence of these advantages compared with their absence.

The distinction drawn by Bastiat between the *laborious* supply of human wants and their *gratuitous* supply by nature, is eminently favorable here. Nature does what elsewhere, by much labor, art must accomplish. Take warmth for example, and compare the necessary provision for our winters and those of a cold country. Take the food of cattle as another illustration, and think of them as grazing through the winter on barley, oats, or rye in the South, compared with cattle housed through the winter and fed on dry forage in the North. In the spring, the farmer of each section has his ox or his cow, but how different the trouble and expense! So far as natural advantages go, nature has just stopped short of prodigality.

The people of the State are (it may be considered as a matter of course) much attached to the country, and accustomed to refer to it always in terms of highest appreciation. "The Sunny South," "The Land of the Sun," "The finest land the sun shines on," "The Garden-Spot of the World"—these expressions are not infrequent. Many Northern men have endorsed them. Men who have travelled extensively have said, that taking it all in all, it is one of the finest countries to live in. The land is not so rich as in some sections, but ill

health usually accompanies very rich land ; yet one year with another, with good management, there will be a reliable quantity of products, both for supplies and for sale.

For home comfort and abundance, no country is better suited, if one will but make them a prime object. Germans and other foreigners have frequently remarked on the advantage of winter crops, and the ground working for them all the time, and not being ice-bound in winter.

Increased population would rapidly lead to diversification of pursuits, which again would rapidly develop the needed capital from within, if not from abroad; and we do not hesitate to say, as the result of observation and experience, that the best immigration, next to that from the neighboring States (of South and North Carolina and Virginia), is the immigration from the Northern States, rather than from abroad. These are soonest assimilated. The best means of harmonizing the sections is by the mutual acquaintance to which such immigration will give rise. Sectional antipathies are based on mutual ignorance, and disappear before knowledge.

#### SUGGESTIONS TO IMMIGRANTS.

Come and see for yourselves. Do not expect fairy-land, or exemption from labor and care ; but come and compare climate, productions, and the general conditions of comfort with those to be had elsewhere, and you will find them to compare favorably. You will quickly see that we have not improved our natural advantages adequately ; but you will find that Nature has done her part well ; and if you but bring with you good habits of painstaking and economy, you will soon build up a delightful home. You will find good sense and good feeling ; and in any considerable community, men of culture and refinement. Still generally they do not show so well at first as on longer acquaintance.

You should visit the country, and see the capacities of the soil and climate. Do not regard the present agriculturists as knowing every thing, nor yet fall into the contrary error of supposing they know nothing. In fact, they know much ; yet the present is but a transition state, and they have not fully solved the problem of conformity to the new conditions

of life and labor. The young men and the new men are now on an equal experience level with the old · so you will have a fair start.

The inducements generally referred to are agricultural. Those for manufacturers are equally great. For success in these, nothing is needed but capital and good management; and where will they thrive without both? All the needful conditions are here for the development of the most profitable manufacturing industry in the whole country. We were just beginning to reach that stage of development when the war arrested it. Again, in Georgia, more rapidly than anywhere else in the South, this progress has begun. There is, too, a large population fit for it, and to be benefited by it. Climate, material, and power, all exist together in an unsurpassed condition. Mining can be profitably pursued, under like conditions of capital and good management.

Professional men we do not need so much as men of science and skill. Our people have, themselves, devoted much more of their time to other subjects than to science or to expertness in labor.

We would not overestimate the advantages. There are drawbacks to all good things, and compensations to all evils. We would not encourage Utopian views, but we think Georgia, all things considered, one of the most desirable of all the States open for immigration, and still inadequately populated. In all lands, there are sickness and death, hard times, evil days and evil people, mixed with the blessings and the good things of life. Trouble and discipline, labor and sorrow, are incident to all climes; yet Nature has been prodigal in her gifts to us, and man needs only average care and skill to make here as happy homes as the world has ever known. The earth, with its range of productions, the sun and air and conditions of climate, the abundant wood and water and water-power, the present settled state of the country and degree of development, and the future promise for one's children of a still higher development—all point to the South as admirably suited for immigration, and to no part of the South more than to Georgia.

# I. THE COUNTRY.

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## GEOLOGICAL SURVEY OF THE STATE.

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### 1. OUTLINE OF PHYSICAL FEATURES.

*to a general idea*  
IN the following pages the object will be to convey to the reader a correct outline of the appearance of the surface of the State, ~~and~~ the materials which make up that surface and the underlying crust of the earth, so far as penetrated either by the farmer's plough or the miner's pick ; to describe the drainage system of the State in its relation to the location of mills and factories ; the transportation of materials of export and import, and the natural supply of timber for building or manufacturing, as they appear to one making a mineralogical, geological, and physical survey.

From Lookout Mountain, in Dade County, one can see the larger part of Cherokee Georgia. From Pine Log Mountain in Bartow, and Stone Mountain in De Kalb, or Mount Airy in Habersham, one sees Northern-Middle Georgia. From Brown's Mountain in Bibb, one can get an idea of Southern-Middle Georgia. From Paramore's Hill, Scriven County, one may see the characteristic features of South-eastern Georgia.

Standing on Pine Log Mountain, on the border of Bartow and Cherokee Counties, one sees in the north-west the High Point of Lookout Mountain, which is the continuation of the Alleghany or Cumberland Range ; toward the north, Fort Mountain, the southern extremity of the Cohuttas, a prolongation of the Unaka or western branch of the Blue Ridge ; to the north-east, Grassy Mountain, the south-western extremity of the Blue Ridge proper, which extends to the Enota in Towns County, and to the Rabun Bald.

A little north of east, a prominent point is Mount Yonah in White County, which, with Walker's Mountain in Lumpkin, Sawnee Mountain in Forsyth, Sweat, Kenesaw, and Lost Mountains in Cobb, and Oak Ridge in Carroll Counties, form a line of peaks extending north-east and south-west across almost the entire State, from South Carolina to Alabama; and the five last named divide the Chattahoochee waters from those of the Alabama.

To the south-east of Pine Log can be seen Stone Mountain, the last high point in the Chattahoochee Ridge which extends in a similar manner across the State north-east and south-west, and divides the Chattahoochee from the streams which empty into the Atlantic east of Atlanta, from those west of this place which flow into Flint River, and unite with the Chattahoochee, just after crossing the Florida line, forming the Appalachicola which runs to the Gulf of Mexico.

To the south-west, one sees Pine Mountain, an extension of Pine Log; and west of that are the Allatoona Hills of Bartow County, south of Etowah River; and still farther Carnes Mountain in Polk, and the Dug Down Mountains which separate Polk from Haralson, reaching to the Alabama line. The region in view embraces North-west or Cherokee Georgia, and is the main portion of the mineral territory of the State.

Lookout is the highest of a series of ridges—named Sand Mountain, Lookout Mountain, Taylor's Ridge, Johns Mountain, and Chattoogata Ridge—running north-east and south-west from Tennessee into Alabama, and containing the Coal and fossiliferous Iron Ore. — *This ridge has no coal & probably none*

The Cohutta is a continuation of the Unaka Range of Tennessee, and runs north and south, containing Copper with some Lead and Silver Ore. On the western border of this range are the beds of Baryta, Manganese, Brown Hematite Iron Ore, and Slate.

On the east, between the Cohutta and the Blue Ridge, is one belt of Marble, and adjacent to it the Gold-bearing Schists which extend from North Carolina to Alabama and reappear on the south side of the Blue Ridge, with a belt of Serpentine Soapstone and Limestone on the north side of the Chattahoochee Ridge, in the rich Gold territory of Habersham, White, Lumpkin, Forsyth, and Hall Counties, lying north of

*Lookout and Sand Mountain are Table top.*

these calcareous and magnesian carbonates and silicates, and extending from South Carolina to Alabama.

South of the Chattahoochee Ridge, there is another Soapstone belt with similar hydromica, micaceous, and chloritic schists, which is also to some extent Gold-bearing. After passing a series of hornblendic Gneisses, there comes still another belt of steatitic, silicious, and hydromicaceous schists, on a line with Graves' Mountain in Lincoln County; and after passing another hornblendic belt, the same again recur on the line of Oak and Pine Mountains in Harris County, bounded on the south by Gneisses and Granite.

The intervals between these Gold-bearing rocks make the Blue, Chattahoochee, and Oak Mountain Ridges, and are at some points Copper-bearing.

This brings us to the middle of the State, where the Railroad from Augusta, *via* Milledgeville, Macon, and Columbus, marks the border of the

#### CRETACEOUS AND TERTIARY SEAS.

The Cretaceous extended from Columbus <sup>nearly to</sup> ~~to~~ Butler, and formed deposits from this line south to Pataula Creek, above Fort Gaines. The Tertiary covered the rest of the State with Marl-beds, Limestones, etc., as far south as to Chatham County, and thence by the junction of Oconee and Ocmulgee Rivers, and *via* Quitman on the Withlacoochee, to the Florida line. The latest tertiary sands and clays cover the remainder of the State, or South-eastern Georgia, and gradually descend to the Okefinokee Swamp, not much more than one hundred feet above the level of the sea.

The surface of the State shows one other peculiar feature, in the heavy beds of sand, gravel, and pipe clay, which border the older granitic and gneissoid rocks along the line of railroad referred to above, and extending generally 10 to 20 miles southward, sometimes forming hills capped with ferruginous sandstone. These deposits have been referred to the flooding of the Southern States by the water from melting ice at the close of the *Glacial Period*, when the rocks of the Northern States were grooved and striated by the grinding of the immense ice-masses which covered the greater portion of the

continent north of the Ohio River, and, by their melting, deposited "Moraines" and drift-beds over the Middle States; while the floods of water from their extremities poured over the Atlantic and Gulf States in streams which formed gravel-beds at Washington, Richmond, Fayetteville, Columbia, Milledgeville, Tuscaloosa, Jackson, and Vicksburg, laying the foundations for Capital cities in a soil admirably drained, and with fine springs of freestone water just at the head of navigation of the principal rivers.

After this Glacial or Drift Period closed, there was a slower flow of the waters; the sediment deposited formed a blue clay, which is the characteristic of our rice swamp and tide-water swamps, and this was the last change that the surface underwent until the period when man began to record his observations in the *Human Age*, to mark on trees, ~~and~~ rocks and wharves the highest and lowest water-marks, to observe the amount of mud and sand deposited each year by the spring freshets, and to note the gradual filling up of marshes by the sediment from streams flowing into them, the accumulation of vegetable matter from leaves and branches and moss-beds, and the building of reefs by the gradual accumulation of oyster-shells along the coasts.

## 2. GEOLOGY.

Geology is the science which describes the physical features of the earth, the rocks which compose its crust, the order of their arrangement, the remains of vegetable and animal life which are buried in the layers accessible to man, and the forces which have in the past made changes in these layers, or are now doing so. It is interesting to the Agriculturist, the Miner, the Manufacturer, and the Merchant.

To the Farmer, it is of the highest importance to know the origin of the soil which he cultivates, and the causes of the changes which it undergoes.

To the Miner, it is essential that he should understand the relations of the metal-bearing rocks to those which are of no value, so that he may expend his labor where profit will result.

To the Manufacturer, the cheapest power that can be applied is furnished by the waterfalls formed by the passage of streams over beds of rocks which resist their wearing effect.

To the merchant, the cost of transportation is a prime factor in estimating his profits ; and this is regulated by the number and character of the rivers which furnish the cheapest means of conveyance, and the mountain ranges which impede traffic or limit the range of the market in supply and demand.

Let us inquire, What are soils ? They are simply the result of the action of the atmosphere and water, and the heat of the sun, or the disintegrating effect of frost on the rocks which make up the earth's surface, and the remains of vegetables and animals mingled with these. They consist of the same elements as the rocks from which they are derived ; and these rocks are made up of minerals, which, in turn, can be separated into chemical elements or simple bodies which can not be further separated—in other words, are not compound.

The ancients recognized only four elements of which all natural objects were supposed to be composed—viz., Earth, Air, Fire, and Water.

Chemists have been able, by means of the galvanic battery, to separate water into two gases, Hydrogen and Oxygen. The air or atmosphere they have found to be a mixture of two gases, Oxygen and Nitrogen, with a small and variable amount of watery vapor, and a still less amount of Carbonic Acid and Ammonia. The Earth, or the rocky crust which is exposed to view on the surface, and those substances which are dug out of it called Minerals, they find to contain about 69 elements of different physical properties.

In digging the deep mines and boring artesian wells, it has been found that there is a constant and tolerably regular increase of heat, after passing 50 feet as we descend toward the centre of the earth, amounting to about 1 <sup>°</sup>~~per cent~~ degree for every 100 feet. At a depth of 30 miles, this heat would, at this rate, become so great as to melt iron, and at 50 miles all the other metals and the rocks, but for the fact that the increase of pressure of matter above, raises the melting-point of these rocks. It is also known that all bodies give out heat into the air or surrounding bodies in space ; and hence the conclusion is drawn that, during the long period which has elapsed since the earth was created, there has been a gradual diminution of its temperature, and that originally it existed in a gaseous condition. Then, as it cooled, it became liquid, and finally

the outer portion or crust became solid, while beneath the crust, at a depth of 20 or 30 miles, there may still be found liquid matter, such as is thrown out from volcanoes as lava, and such as the Trap-rock which we find penetrating the other and stratified rocks. Cooling is accompanied by contraction. As this has taken place, the figure of the earth has been modified so as to form two immense troughs, in which the water has collected, separated by two large bodies of land, the Western Continent or America, and the Eastern Continent or Old World. The Western Continent has two long ranges of mountains parallel to the borders of the oceans—the Appalachians on the Atlantic, and the Rocky Mountains on the Pacific side.

From the shells, bones, teeth, etc., of animals found in the rocks, it is inferred that animals to which these parts belonged, lived while the sand, clay, etc., in which we find them were being deposited from water. By comparing these relics which we *dig up*, and hence call *fossils*, with the corresponding parts of animals now living, we find that those dug up near the ocean are very nearly of the same kind as those now living.

The oyster-shells found near the line of Chatham and Effingham Counties are almost exactly like those of the raccoon oyster now living in the neighborhood of Savannah. The shells found at Enoch's Mill, in Effingham County, are somewhat different from those now living on the sea-coast; and the vertebral bones found there are those of a saurian or lizard-like animal, but not the same as those of the alligator now living in Okefinokee Swamp.

The shells found in the marl-beds in Scriven County differ still more from those now living; and at Shell Bluff, in Burke County, we find oyster-shells a foot long, which no one would take for the edible Virginia or Savannah oyster.

The corals which we find on Lookout Mountain are entirely different from those found near Thomasville. In the lime-stones of Dade Valley, near Trenton, we find the remains of animals called *Orthoceras*, entirely different from any now living in any part of the world. In Bartow County, near Adairsville, we find a remarkable fossil, called by geologists *Lingula*, from its tongue shape, and from its being found in the lowest rocks, *Lingula prima*, a form of life which has had repre-

sentatives or relatives in all the rocks which have been formed, from the lowest to the highest.

The remains of plants found buried in the shales of Lookout and Sand Mountains are entirely different from any now living, from the mountains to the seaboard of Georgia.

Again, we find rocks in which there is no vestige of life excepting a few sea-weed impressions and worm-holes bored by animals, when the mud and clay were soft and still retained in the rocks after they have been subjected to pressure from hundreds of feet of matter piled in layers above them.

Finally, there are rocks in Georgia which show no signs of there being any thing living at the time they were deposited ; and these rocks are as hard as if they had been baked in a pottery-furnace for a thousand years, and we find running through them veins and wedges of Granite and Trap, which look almost the same as the lava now pouring from Vesuvius.

From these and thousands of similar data, geologists have reasoned, that after the earth had cooled enough to form a solid crust, the water and atmosphere gradually wore away the exposed rocks, and spread out—or, to use a Latin word, *stratified*—the grains of sand and particles of kaolin and fragments of limestone over the sea-bottom. The sea-weeds which grew in the warm waters of the ocean were sometimes buried in the layers ; and on the beach, worms, which could live in water almost boiling, bored their holes in the soft sand or plastic clay.

As the earth and the waters above the earth cooled still farther and contracted still more, life in the waters increased ; and the Brachiopods, or animals with arm-like feet, began to float around in search of food, and corals began to grow and form reefs. In the shallow waters hemmed in by these coral reefs, there began to grow a luxuriant swamp vegetation inhaling the superabundant carbonic acid of the atmosphere, and giving off again the oxygen for air-breathing animals, while they stored away the carbon in their own skeletons or trunks; and when they died formed peat-bogs or marsh-muck-like that which now covers the Okefinokee Swamp to a depth of four or five feet.

By an oscillation or bending of the earth's crust beneath the swamp, there came an inroad of the sea-water, bringing clay

and sand and pebbles, and covered up the vegetable matter, just as the charcoal-burner does his kiln, in a small way ; and then, as the sands accumulated and the bottom of the marsh and the underlying crust bent down beneath the increased weight of deposits, and approached nearer the central heat, these plants were partially coked and lost a large part of the oxygen and hydrogen which they contained as water or steam; and the portion made of carbon remained partly as *fixed* carbon, while some of it united with hydrogen as hydrocarbon or bitumen, to serve as a source of gas for our modern gas-meters.

In some places, the bending down of the earth's crust was so great that a break occurred, and the heated rocky matter from the interior escaped in the form of trap dikes, granite veins, etc.; and where these came near the coal, the bitumen was driven out, and left pure carbon as Anthracite Coal, as in Pennsylvania.

This has not occurred near enough to the coal deposits in Georgia to form this kind of coal, though in some of the older rocks we find it in another and still more altered form, as Graphite or Black Lead, which is nearly pure carbon with a little Iron ; and in the Itacolumite Sandstones, small quantities of carbon have perhaps been changed to the purest form, that of the Diamond ; since occasionally we find a perfectly crystallized Diamond in the *débris*, resulting from the washing down of this sandstone in White, Hall, and Lumpkin Counties. Three of these are now in the State, one beautiful crystal having 24 faces, or reflecting surfaces ; another having 48 faces, and a third which has been cut and polished by the jeweller and set in a ring.

One other form of carbon occurs in Clay County, near Fort Gaines, which still shows the woody structure, and is called Lignite.

The rivers of the present day are constantly wearing away the rocks, and deposit at their mouths a fine sediment, and, when they overflow, a similar alluvium along the flats outside of their banks.

The land near the mouths is sometimes raised by the oscillations of the earth's crust, and land vegetation then begins. There have been apparently a number of these eleva-

tions in Georgia, which have not only been sufficient to raise the country about the mouths of rivers, but the whole coast region, from 15 miles above Savannah, along a curved line to the junction of the Oconee and Ocmulgee where they form the Altamaha, and around to the west, embracing the country where the Allapaha and Withlacoochee now have their feeders in the branches and creeks of Irwin and Colquitt Counties, and along the ridge which divides these from the headwaters of the Ocklockonee and the streams of Thomas County, forming the water-shed which separates the streams emptying into Appalachee Bay and the Gulf of Mexico, from those tending toward the Atlantic.

Another elevation of the land exposed all that portion of the State lying between this line and one drawn from Augusta, *via* Macon, to Pataula Creek, above Fort Gaines on the Chattahoochee.

Another brought up the old ocean-bed from Macon to Columbus.

The next elevation in point of time brought up all the North-west portion of the State bounded by the Tennessee and Alabama lines, the Cohutta Mountains in Murray County, the Allatoona Hills in Bartow, and the Dug Down Mountains in Polk County.

Before this there must have been another which raised Lookout Mountain and others parallel to it as far east as Rocky Face Ridge, Dalton, and Rome; so that the streams have cut them through lengthwise from north-east to south-west.

Still another elevation exposed the country lying between the Selma Rome & Dalton Railroad, and the line already mentioned of the Cohutta and Dug Down, so that it has been denuded lower than any other section of the State; and perhaps at that time the Tennessee River found its way southward to the Gulf. At this period in the history of the state, we find evidence of a very extensive upheaval of the continental mass along the Atlantic slope.

## METAMORPHISM.

The effect of internal heat on the shales, limestones, sandstones, and iron ores, has been to convert the sandstones into Quartzites, the shales into Slates, the limestones into Marbles, the mixtures of sand, lime, clay, iron, and carbon into Gneisses, Mica schists, Talcose schists, Chloritic and Graphitic schists.

In some cases, the materials have been separated into distinct crystals, as Quartz, Rutile, Beryl, Tourmaline, Magnetic Iron, Pyrite, Barite, Manganite, Staurolite, etc. Lead, Copper, and Zinc ores have also in some cases been brought up in vapors from the lower or central mass, where, by their great specific gravity, they would naturally be collected, and disseminated through the stratified rocks, either in layers or veins, or in minute or indiscernible particles scattered through the slates, and afterward, by the aid of steam or dissolved silica and alkalis, have been concentrated into the crevices of the rocks, wherever broken, and forming cavities for their reception. Even Gold, one of the heaviest metals, has thus been found in many counties of the State, either segregated or scattered.

## ELEMENTS, MINERALS, AND ROCKS.

The crust of the earth has been compared to a great historical work, which represents the unfolding of creation and building up of our planet. The divisions and chapters of this work are represented by the Geological Formations; the paragraphs and sentences by the Periods and Epochs of each Formation; the words of the sentences by the different Rocks, and the single letters of each word by the simple Minerals.

For a thorough understanding of this work, a knowledge of the minerals which form the rocks, as well as the different kinds of rocks, is necessary. These minerals are characterized (1) by their chemical composition; (2) by their physical properties—viz., their specific gravity or weight compared with water as a standard; their hardness, color, and lustre; and (3) by their cleaving or splitting, giving their common crystalline forms, as Cubes, having six equal faces or sides—*e.g.*,

Iron Pyrites and Galena; or as Octahedrons, having eight faces—*e.g.*, Magnetic Iron Ore; and Dodecahedrons, having twelve faces—*e.g.*, Garnet; or as Prisms, with six sides and two ends—*e.g.*, Beryl; or Pyramids, like those on the ends of Quartz, which are usually connected by a six-sided prism; or, again, as prisms with faces like Staurolite, Feldspar, or Rutile.

## ELEMENTS.

Of the 69 elements which chemical science has recognized, only 16 are sufficiently common to need further investigation by us; and these are found combined and mingled in every soil that we cultivate.

These elements are, in their order of abundance and importance, (1) Oxygen and (2) Hydrogen, which combined form water. These, with (3) Nitrogen and (4) Carbon, make up the air. These four compose by far the greater part of all Plants and Animals. Oxygen combines with all the other elements, and especially do we find it abundant in union with (5) Silicon, (6) Aluminum, (7) Iron, (8) Manganese, (9) Calcium, (10) Magnesium, (11) Potassium, (12) Sodium, (13) Phosphorus, (14) Sulphur, and (15) Chlorine.

Magnesium, Oxygen, and Silicon form Talc, the softest of all minerals, and called in the scale of *hardness*—1.

Calcium, Sulphur, and Oxygen, with water, form Gypsum, and ranks—2.

Calcium, Carbon, and Oxygen form Calcite, whose hardness is—3.

Calcium and Fluorine form Fluorite, and of hardness is—4.

Calcium, Phosphorus, and Oxygen form Apatite and in hardness is—5.

Calcium, Sodium, or Potassium, with Aluminum, united to Silicon and Oxygen, form Feldspar—6.

Silicon and Oxygen or Silica (Flint or Quartz) has hardness rated—7.

Silicon, Aluminum, Oxygen, and Fluorine form Topaz, of hardness—8.

Aluminum and Oxygen form Corundum which is—9.

Carbon, pure and crystallized, is the Diamond, and hardest of all—10.

Iron is combined with oxygen in various proportions, and is called *Hematite* when 2 parts of Iron (Fe) combine with 3 parts of Oxygen (O). *Limonite*, or Brown Iron Ore, has in addition to  $\text{Fe}_2\text{O}_3$  of Hematite, 3 parts of water. *Magnetite*, or Magnetic Iron Ore, contains 3 parts of Iron and 4 parts of Oxygen. Iron combines with Sulphur to form *Pyrite*, which by weight contains of Iron 46 per cent, and of Sulphur 53 per cent.

Copper Pyrites, or *Chalcopyrite*, contains in addition to 30 per cent of Iron, and 36 per cent of Sulphur, 34 per cent of Copper.

Manganese with Oxygen forms Pyrolusite, from which Mr. W. P. Ward, of Bartow County, is now making ferro-manganese, containing 60 per cent of manganese, worth \$180 per ton.

For smelting Iron from the first three, there have been erected in the State about 20 Furnaces, with a capacity for producing about 300 tons per day, or 100,000 tons of pig-iron per annum, worth now about \$20 per ton, or \$2,000,000 per annum. Only one of these (it is believed) is now in blast—that at Bartow Station on the W. & A. R.R.

For smelting Copper, there were, before the war, extensive works erected at the "Mobile Mine" in Fannin County, but they were burned, and have not yet been rebuilt. There is a prospect of a company erecting works soon at the "Hiwassee Mine," in Towns County. At the "Waldrop Mine," in Haralson County, the Tallapoosa Mining Company have cut a vein of chalcopyrite, etc., yielding, on an average, 8 per cent for 125 feet longitudinally, in a drift that has been opened, and the bed of ore found to average 5 feet in thickness for this distance. It is about 80 to 100 feet from the surface.

## LIST OF IRON FURNACES IN GEORGIA.

						Capacity. Tons per Day.		
1.	Bartow Furnace,	Bartow Station,	Bartow Co.			20		
2.	Charcoal	"	"	"	"	7		
3.	Rogers	"	Rogers	"	"	7	Out of blast.	
4.	Pool's	"	Stamp Creek.	"	"	4	"	"
5.	Brown and Thomas Furnace,	"		"	"	4	"	"
6.	Cherokee Furnace,			Polk	"	40?	Not in blast.	
7.	Ætna	"		"	"	10	"	"
8.	Ridge Valley Furnace,			Floyd	"	12	"	"
9.	Rising Fawn	"		Dade	"	50		
10.	Ward's Diamond Furnace,			Bartow	"	4		
11.	Stamp Creek Furnace,			"	"	4	Not in use.	
12.	Etowah Furnace,			"	"	4	"	"
13.	Allatoona	"		"	"	4	"	"
14.	Phoenix	"		Dade	"	40	Not completed.	
15.	Cherokee	"		"	"	40	"	"
						248		

## SYMBOLS OF CHEMICAL ELEMENTS IN MINERALS.

For the sake of brevity, chemists have adopted the following symbols to represent the different elements and their combinations :

Oxygen=O.	Tellurium=Te.
Hydrogen=H.	Arsenic=As.
Carbon=C.	Molybdenum=Mo.
Sulphur=S.	Zinc=Zn.
Silicon=Si.	Chromium=Cr.
Titanium=Ti.	Nickel=Ni.
Chlorine=Cl.	Silica or Sand= $\text{SiO}_2=\text{Si}+2\text{O}$ .
Sodium or Natrium=Na.	Alumina= $\text{Al}_2\text{O}_3=2\text{Al}+3\text{O}$ .
Potassium or Kalium=K.	Ferric Oxide= $\text{Fe}_2\text{O}_3=2\text{Fe}+3\text{O}$ .
Calcium or Lime Metal=Ca.	Ferrous Oxide=FeO.
Magnesium=Mg.	Manganic Oxide= $\text{Mn}_2\text{O}_3$ .
Barium=Ba.	Manganous Oxide=MnO.
Clay Metal or Aluminum=Al.	Calcic Oxide (Lime)=CaO.
Iron or Ferrum=Fe.	Magnesia=MgO.
Manganese=Mn.	Water= $\text{H}_2\text{O}=2\text{H}+\text{O}$ .
Cuprum or Copper=Cu.	Soda=NaO.
Plumbum or Lead=Pb.	Potash=KO.
Aurum or Gold=Au.	Baryta=BaO.
Bismuth=Bi.	Boracic Acid= $\text{BO}_3$ .



## PHYSICAL CHARACTERS OF MINERALS FOUND IN GEORGIA.

NO.	NAME.	CHEMICAL COMPOSITION.	SPECIFIC GRAVITY.	HARDNESS.	COLOR.	LOCALITY.	USES.
1	Diamond....	Carbon.....	3.5	10	Colorless.	White, Hall, Dawson.	Lead pencils.
2	Graphite....	"	2	1-2	Black.	Pickens, Carroll, Elbert.	Fuel.
3	Coal.....	"	1.2-1.7	1-2.5	"	Dade, Walker, Chattooga.	Sulphuric acid and gunpowder.
4	Sulphur.....	Sulphur.....	2	1.5-2.5	Yellow.	Fulton, Haralson.	
5	Gold.....	Gold.....	15.5-19.5	2.5-3.	Yellow, gold yellow.	White, Lumpkin, Hall, Carroll, etc.	
6	Tetradymite.....	Telluric Bismuth.....	7.2-8.4	1.5-2	Steel gray	Paulding, Lumpkin.	
7	Galena.....	PbS.....	7.2-7.7	2.5	Lead gray.	Murray, Hall, Habersham.	
8	Pyrite.....	FeS <sub>2</sub> .....	4.8-5.1	6-6.5	Bronze yellow.	Haralson, Fulton.	Sulphuric acid.
9	Mispickel..	FeS <sub>2</sub> + FeAs <sub>2</sub> .....	6.0-6.4	5.5-6.	Steel gray.	Floyd.	Arsenic.
10	Molybdenite.....	MoS <sub>2</sub> .....	4.4-4.8	1-1.5	Lead gray.	Habersham.	
11	Chalcopyrite.....	CuS + Fe <sub>2</sub> S <sub>3</sub> .....	4.1-4.3	3.5-5	Brass yellow.	Fannin, Towns, Cherokee, Paulding, Haralson, Carroll, Greene, and Fulton.	Copper.
12	Halite.....	NaCl.....	2.1-2.5	2.5.	White.	Harris, Talbot, Carroll, Habersham, Lumpkin.	Table Salt.
13	Magnetite.....	FeO + Fe <sub>2</sub> O <sub>3</sub> .....	5.	5.5-6	Black.	DeKalb, Meriwether.	Iron.
14	Franklinite.....	FeOzOMn <sub>2</sub> O <sub>3</sub> .....	5.5-6.5	5.	"	Habersham.	Paints.
15	Chrome Iron.....	FeOCr <sub>2</sub> O <sub>3</sub> .....	4.3-4.5	5.5	"		
16	Water.....	H <sub>2</sub> O.....	1.	1.5	Colorless.		
17	Corundum.....	Al <sub>2</sub> O <sub>3</sub> .....	3.9-4.0	9.	"	Towns, Rabun, Carroll.	Gem and for polishing.

## PHYSICAL CHARACTERS OF MINERALS FOUND IN GEORGIA—(continued.)

NO.	NAME.	CHEMICAL COMPOSITION.	SPECIFIC GRAVITY.	HARDNESS.	COLOR.	LOCALITY.	USES.
18	Hematite.....	$\text{Fe}_2\text{O}_3$ .....	5.	5-6.5	Pink and blue, steel gray, and iron black.	Bartow.	Iron.
19	Ilmenite.....	$\text{Ti}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3$ .....	4.5-5	5-6	Black.	Bartow, Towns.	Coloring artificial teeth.
20	Pyrolusite.....	$\text{MnO}_2$ .....	4.8	2-5.5	"	Lincoln, Habersham.	Iron.
21	Rutile.....	$\text{TiO}_2$ .....	4.1-4.2	6-6.5	Yellowish black.		
22	Limonite.....	$\text{Fe}_2\text{O}_3\cdot\text{H}_2\text{O}$ .....	3.6-4	5-5.6	Dark brown.	Polk, Bartow, Gilmer, Fannin, Murray, Burke, etc.	
23	Quartz.....	$\text{SiO}_2$ .....	2.5	7.	Colorless.	Gwinnett, Troup, Habersham, Oglethorpe, Harris, Talbot, etc.	
24	Opal.....	$\text{SiO}_2 + \text{H}_2\text{O}$ .....	1.9-2.3	5.5-6.5	White, yellow, red, gray, etc.	Washington County.	Gem.
25	Meteoric Iron.....	$\text{Fe}\&\text{Ni}$ .....	7.3-7.8	4.5	Iron gray.	Whitefield.	
26	Pyroxene.....	$(\text{CaOMgFeO})\text{SiO}_3$ .....	3.2-3.5	5-6	White, green, and black.		
27	Rhodonite.....	$\text{MnSO}_4$ .....	3.4-3.6	5.5-6.5	Red and brown.		
28	Hornblende.....	$(\text{MgOCaO})\text{SiO}_3$ } $(\text{MgOCaO})_2\text{SiO}_3$ }	2.9-3.4	5-6	White to black.		
29	Beryl.....	$\text{Al}_2\text{O}_3 + \text{Be}_2\text{O}_3\cdot\text{SiO}_3$ .....	2.6-2.7	7.5-8	Green.	Meriwether, etc.	
30	Chrysolite.....	$(\text{MgFeO})_2\text{SiO}_3$ .....	3.3	6.5-7	"	Rabun, White.	
31	Garnet.....	$\text{Mn}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3\cdot\text{Al}_2\text{O}_3\cdot\text{SiO}_2$ .....	3.1-4.3	6.5-7.5	Red and brown.	Paulding, Cherokee.	
32	Epidote.....	$\text{CaOSO}_4\cdot\text{Al}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3$ .....	3.3-4	6.5	Green and brown.	Troup.	

		$\text{SO}_2\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3\text{MnO}_4$ { KO.....	2.7—3.1	2.5—3	Black.	
33	Biotite.....				Black.	
34	Muscovite.....	$\text{SO}_2\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3\text{MgOKO}$ .....	2.8—3.1	2.5	Colorless.	
35	Labradorite.....	$\text{SO}_2\text{Al}_2\text{O}_3\text{CaONaO}$ .....	2.6—2.7	6	Brown.	Talbot.
36	Orthoclase.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{KO}$ .....	2.4—2.6	6	White and red.	
37	Staurolite.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{FeOMgO}$ .....	3.6	7—7.5	Dark brown.	
38	Kyanite.....	$\text{SiO}_2\text{Al}_2\text{O}_3$ .....	3.6	5—7	White and blue.	
39	Tourmaline.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3\text{CaOMgO}$ NaOF.....	3.0—3	7.8	Black, brown.	
40	Talc.....	$\text{SiO}_2\text{MgOFeOH}_2\text{O}$ .....	2.5—2.9	1—1.5	White and gray.	
41	Sapelite.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{MgOH}_2\text{O}$ .....	2.6	1.5	White to red.	
42	Serpentine.....	$\text{SiO}_2\text{MgOH}_2\text{O}$ .....	2.5	2.5—4	White to green.	
43	Chlorite.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3\text{MgOH}_2\text{O}$ .....	2.6—2.8	1.5	Green.	
44	Barite.....	$\text{BaSO}_4$ .....	4.3—4.8	2.5—3.5	White.	Bartow.
45	Gypsum.....	$\text{CaOSO}_4\text{H}_2\text{O}$ .....	2.3	1.5—2	Gray.	
46	Pyromorphite.....	$\text{PbPO}_4\text{Cl}$ .....	6.5—7	3.5—4	Green and brown.	
47	Lazulite.....	$\text{Al}_2\text{O}_3\text{SiO}_2\text{Fe}_2\text{O}_3\text{MgOPO}_4$ .....	3	5—6	Blue.	Lincoln.
48	Wavellite.....	$\text{Al}_2\text{O}_3\text{H}_2\text{OPO}_4$ .....	2—2	3.5—4	White, yellow.	Polk.
49	Calcite.....	$\text{CaCO}_3$ .....	2.5	3	White.	
50	Siderite.....	$\text{Fe}_2\text{CO}_3$ .....	3.7	3—4.5	Gray to brown.	Carroll.
51	Malachite.....	$\text{CuCO}_3$ .....	4	3.5—4	Green.	Greene, Paulding.
52	Stilbite.....	$\text{SiO}_2\text{Al}_2\text{O}_3\text{CaOH}_2\text{O}$ .....	2.1	3.5—4	White.	Fulton.

## CRYSTALLINE ROCKS.

- 1 Dolerite consists of Labradorite, Augite, and Magnetic Iron.
- 2 Diabase       "       "       "       " Chlorite.
- 3 Hypersthene consists of Labradorite and Hypersthene.
- 4 Diorite       "       Hornblende and Albite.
- 5 Syenite       "       "       " Orthoclase.
- 6 Granite       "       Quartz, Mica, and Feldspar.
- 7 Gneiss       "       "       "       "       " *banded*.
- 8 Granulite     "       "       and granular Feldspar.
- 9 Mica Slate    "       "       Mica, which is varied by addition of  
other Minerals.
- Hydromica Slate or Schist, Quartz, and hydrous Mica, and called Tal-  
cose when it consists of Quartz, Mica, and Talc.
- Chloritic Slate consists of Quartz, Mica, and Chlorite.
- Hornblendic Slate consists of Quartz, Mica, and Hornblende.
- Graphitic Slate       "       "       "       " Graphite.
- 10 Itacolumite       "       "       and Talc.

## SEDIMENTARY ROCKS ARE

- Clayey, as Shales, Slates.
- Marly, as beds of sand and clay with shells.
- Calcareous, as limestone, dolomites.
- Silicious, as laminated sandstones, sand-beds, etc.
- Conglomerate, as granite conglomerate of Augusta, ferruginous conglomerate of the Drift.
- Carbonaceous, as coal-seams, lignite-beds, graphitic slates.

## ROCKS (CRYSTALLINE).

*Dolerite or Trap.*—(1) This is an igneous rock. It came to the surface in a melted state through an opened fissure. The part filling the fissure is called a *dike*. Trap is a very hard, dark, and heavy rock. The surface is generally yellow or red from decomposition, but its interior is a dark blue. Its weight has caused it to be considered an iron ore by many who know nothing of its constituents. A very large dike of trap extends from a point east of Newnan, in Coweta County, passing through Meriwether, over Pine Mountain, near the Chalybeate Springs, into Talbot County, and on the easterly edge of Hamilton to a point three miles north-east of Geneva. There are many other dikes in the State. The rock is a compound of Labradorite and Augite, and is called *Dolerite*.

*Syenite* (5).—Some granite rocks contain Hornblende instead of Mica, and the name Syenite is given to them. The rock is generally dark from the color of the Hornblende.

*Syenitic Gneiss* (5a) is the name given to the gneissoid variety of Syenite, and is a gneiss containing Hornblende instead of Mica, occurring abundantly in the Blue Ridge, etc.

*Hydromica Schist* (9a) contains a hydrous Mica, has a greasy feel, and looks like Talcose Schist, but contains no Talc. This forms a large part of the rocks supposed to be of Quebec age.

*Marble* (10) is a crystalline limestone, and is found of a black color at Tunnel Hill, red at Dalton, pink at Varnell's Station, blue at Rockmart, white near Jasper in a bed 50 feet thick on the bank of Long Swamp Creek, and also blue on the same creek. Another locality of the white is near Buchanan, and still another near Van Wert. All of these are Magnesian or Dolomitic limestones, and probably belong to the Quebec age.

*Granite* (6) is composed of grains of Quartz, Feldspar, and Mica mixed promiscuously together, and bearing no relative proportion to each other. Sometimes the Mica is a biotite, black variety, but is usually muscovite. The color of granite is usually nearly white in this State. It varies in fineness according as the ingredients are coarse or fine-grained. This is the material of Stone Mountain, and covers a large portion of the metamorphic region of the State.

*Gneiss* (7) has the same constituents as granite, but they are arranged more or less in planes. It appears banded and often splits into layers. On account of the splitting into layers, it is said to be schistose; and this character is the only one distinguishing it from granite. This is the prevailing rock of the group marked Cincinnati.

*Mica Schist* (9) has the same constituents as granite, but the Mica is the most abundant. It divides into thin layers and glistens in the sun, owing to the scales of mica. If the layers are smooth and the scales indistinct, it is called Mica Slate; this variety contains very little quartz.

## ROCKS (NOT CRYSTALLINE).

*Limestone.*—This is of <sup>various</sup> ~~all~~ shades of color, ~~varying~~ from white through gray to brown and black. It is chiefly composed of Carbonate of Lime in rock form. When burnt, the carbonic acid escapes, leaving the lime in the form of quicklime. Chalk and Marble are varieties of limestone. All of the varieties together are called calcareous rocks.

*Sandstone.*—This is a rock made of sand, which may be quartz alone, or may contain feldspar grains, clay, limestone, or mica. The colors are various, from white to red and black. It is sometimes flexible, sometimes flinty, and sometimes saccharoidal, like grains of sugar.

*Conglomerate.*—A conglomerate is composed of gravel and sand or other coarse material, cemented together by lime, silica, or iron. If the latter, the rock is called Ferruginous Conglomerate. This latter is very common along the line of the Quaternary, from Columbus to Augusta, and has frequently been mistaken for Iron Ore.

*Shale* is a fine mud or clay, consolidated into a rock having a slaty fracture, but less firm and less evenly slaty than true slate. Colors are from gray, through red, yellow, brown, and black. Clay is a fine kind of mud, formed by the decomposition of feldspar, and mixed with more or less sand and other impurities. The purest clay is white, and called Kaolin, used in the manufacture of porcelain wares, and found in abundance near Milledgeville, and at other points along the Columbus and Augusta Railroad, formed from the disintegration of the Feldspar in the Granite.

*Argillaceous Sandstone.*—This is a sandstone in which clay forms a large ingredient. When breaking in thin slabs, as it usually does, it is called laminated sandstone.

*Slate* differs from shale in breaking more evenly and being much firmer. Roofing slate is of this kind, of which large quantities are found at Rockmart, in Polk County. This was formed from shale by heavy pressure and heat, by a partial action of the metamorphism previously spoken of.

## 2b, GEOLOGICAL FORMATIONS IN GEORGIA.

The Lower Silurian (from the Silures, ancient inhabitants of Wales) age of rock containing fossils of molluscan type (*i.e.*, those having soft bodies like the oysters of our age, protected by a calcareous shell), is represented in two periods. The hydromica schists of the copper-bearing series of the Mobile Mine and Ducktown, and Ocoee Conglomerates and Slates along the Ocoee River on the Tennessee line, and on the Etowah River near Cartersville, are the lowest in position of the rocks in the State, and form a group of (2) Primordial rocks corresponding to what is called the (2a) Acadian epoch in Canada. The Conglomerate is made up of feldspar and a bluish quartz. The slates are hard and silicious. This group of rocks is overlaid in the Cohutta Mountains, and on Pine Log Mountain in Bartow County, by a sandstone called the Chilhowee, from a mountain of that name in Tennessee, corresponding to the Potsdam sandstone in New York, called from the town of Potsdam in that State, and belongs also to the (2) Primordial period and to the (2b) Potsdam epoch. This sandstone also appears in the north of Haralson and Paulding Counties, and in Yonah Mountain White County, and Tallulah Mountain Habersham County, being at all these places altered into gneiss by metamorphism.

The next period called (3) Canadian, embracing the (a) *Calciferous* or lime-bearing sandstone of New York, the shales, limestones, and sandstone of the (b) *Quebec* epoch in Canada, and the (c) *Chazy* limestone of New York, is represented by impure sandstones and cherty dolomitic limestones in the Northwestern counties; by a sandstone on the western slope of the Cohutta Mountains; and in the metamorphic region to the Eastward and Southward, by calcareous schists, hydro-mica schists, marble and itacolumite of the Quebec epoch, and by calcareous schists of the (a) *Calciferous* epoch.

The (4) Trenton period embraces the limestones of Bartow, Gordon, and Murray, overlying the dolomitic limestones and cherts and the limestones of the valleys in the north-west portion of the State—Lookout Valley, Chicamauga Valley, etc.—of the Trenton epoch in New York. These are followed from Dalton to Rome by the red shales of the (c) *Cincinnati* epoch,

argillaceous  
limestones

Whitefield  
Bartow

not even  
usually

and in the metamorphic region by gneisses and graphitic slates and syenites.

The rocks of the Upper Silurian age in this State belong to the Niagara period (5) of New York, and contain a sandstone of the Medina (*a*) epoch, the fossiliferous iron ores of the Clinton (*b*) epoch, as represented in Lookout Valley and McLemore's Cove, etc., and a limestone of the Niagara (*c*) epoch. They appear only in the north-western corner of the State.

The next New York period, the Salina (6) or Salt-bearing group, has not been recognized.

The Oriskany (8) of the New York survey is ~~not~~ represented in Georgia. *Catoosa County, near Ringgold.*

The age of Fishes, called *Devonian* (from Devonshire, England), is represented in Georgia by the black shale ~~only~~, near Dalton and elsewhere, often mistaken for coal; and this belongs to the Genesee (10*c*) shale of the Hamilton (10) period in New York.

The age of coal plants, or *Carboniferous* age, embraces three periods, two of which are represented in North-west Georgia. Lowest of these is the *Subcarboniferous* (13) period, including the (13*a*) Silicious epoch, or cherty group, and the (13*b*) Calcareous epoch or coral-beds of Dade, Walker, Catoosa, Chattooga, and Floyd Counties. Overlying this we have the Carboniferous (14) period, including the (14*a*) Millstone grit of Lookout and Sand Mountains, and the (14*b*) coal-measures of Dade, Walker, and Chattooga Counties.

The third or Permian (15) period is not found in the State.

These three ages are characterized by fossils, none of which are now living on the earth or in the seas; and, from their old-fashioned forms, the whole of these rocks formed during the Silurian, Devonian, and Carboniferous ages, are included in the Palæozoic time, from the Greek words meaning ancient life—the Primary of early geologists.

In the Mesozoic age, or Secondary of the old geologists, the Triassic and Jurassic periods—represented in other Atlantic States by sandstones, coal and trap dikes—show only the trap dikes of Meriwether, Habersham, and other counties, the sandstones, if they exist, being buried under the deposits of sand, clay, and sandy marls filled with the shells of various animals

which lived in the *Cretaceous* age in the sea-water which washed against the hard granitic cliffs forming the shore-line from Columbus to Butler. The greatest quantity of these remains is found on the banks of Pataula Creek, in Clay County. On examination, these shells prove to be unlike those of animals now living, and also different from those which are found in North-west Georgia, in the rocks made in Palæozoic time ; and hence, as they are intermediate, the age is called that of Middle Life, from the Greek words *mesos* (middle) and *zoe* (life). The forms correspond to those found in the Chalk Cliffs of England ; and hence they belong to the Cretaceous age, from the Latin word *creta* (chalk).

After the sea-bottom of the Cretaceous period was raised above the level of the water, the shore-line extended from Pataula Creek, by Butler, Macon, and Milledgeville, to the Savannah River at Augusta. The oyster-shells found at Shell Bluff, and in Burke, Washington, and other counties, other fossils found in the beds of marl of this region as far south as the line of Chatham County, and the corals found near Thomasville, resemble very much the general forms now living ; and hence the time in which they lived has been called the Cenozoic time, from *kainos* and *zoe*, Greek words meaning recent life. This time embraced two distinct divisions—viz., the Tertiary or third set, and Quaternary or fourth set of rocks.

The Tertiary age is again divided into three periods: 1, that in which only a small per cent of the fossils have representatives now living ; 2, an intermediate period recognized in other States when a minority (45 per cent) of the forms found are like those now living ; and, 3, a later part, in which a majority of the species found buried in the rocks are still living. The first is called the *Eocene*, or dawn of recent life ; the second, *Miocene*, or less recent (than the next) ; the third, *Pliocene*, or more recent—from the Greek words, *eos* (dawn), *meion* (less), *pleion* (more), and *kainos* (recent).

The Quaternary age embraces, 1st, the drift gravels and the clays and sands which border the metamorphic belt from Columbus to Augusta ; 2d, the blue clays of the sea-coast counties ; 3d, the bluff calcareous sand found at Enoch's Mill ; and, 4th, the alluvium of the river-beds now forming.

## FORMATIONS.

The following is the most recent classification of the formations :

	AGES.	PERIODS.	EPOCHS.	FOUND IN GEOR- GIA.
PALÆOZOIC.	Azoic.		Azoic.	
			1a, Laurentian.	
	Eozoic.		1b, Huronian.	
	Silurian Age.	Lower Primordial.	2a, Acadian.	Acadian.
			2b, Potsdam.	Potsdam.
		Canadian.	3a, Calciferous.	Calciferous.
			3b, Quebec.	Quebec.
			3c, Chazy.	Chazy.
		Trenton.	4a, Trenton.	Trenton.
			4b, Utica.	
			4c, Cincinnati.	Cincinnati Shales.
		Upper Niagara.	5a, Medina.	Taylor's Ridge.
			5b, Clinton.	Fossiliferous Iron
			5c, Niagara.	Niagara. [Ore.
		Salina.	6, Salina.	
		Lower Helderberg.	7, Lower Helderberg.	
		Oriskany.	8, Oriskany.	
	Devonian Age.	Corniferous.	9a, Cauda Galli.	
			9b, Schoharie.	
			9c, Corniferous.	
MESOZOIC.			10a, Marcellus.	
			10b, Hamilton.	
			10c, Genesec.	Black Shale.
			11a, Portage.	
			11b, Chemung.	
			12, Catskill.	
	Carboniferous Age.	Subcarboniferous.	13a, Lower.	Silicious.
			13b, Upper.	Calcareous.
		Carboniferous.	14a, Millstone Grt.	Grit.
			14b, Lower Coal Measures.	Lookout and Sand.
			14c, Upper Coal Measures.	Round Mt.
		Permian.	15, Permian.	
	Reptilian Age.	16, Triassic.	16a, Bunter Sandstone.	} Trap Dikes.
			16b, Muschel Kalk.	
			16c, Kenper.	
		17, Jurassic.	17a, Liassic.	
			17b, Oolitic.	
			17c, Wealden.	
		18, Cretaceous.	18a, Lower.	Lower.
			18b, Middle.	Middle.
			18c, Upper.	
AGE OF MAN. CENOZOIC.	Mammalian Age.	19, Tertiary.		} Buhrstone or Clai- borne, Jackson, Vicksburg, Lig- nitic.
			19a, Eocene.	
			19b, Miocene.	
			19c, Pliocene.	
		20, Quaternary.	20a, Port Hudson.	Port Hudson.
			20b, Bluff.	
			20c, Drift.	Drift.
			20d, Alluvium.	Alluvium.

GROUPS OF COUNTIES IN THE DIFFERENT FORMATIONS.

The Archean (1) or Eozoic rocks are not represented in Georgia, so far as is known at present, although there are some rocks near Columbus, and others near Augusta, which may possibly be of the same age as those described by geologists as occurring along the St. Lawrence River and on the shores of Lake Huron, and hence called Laurentian (1a) and Huronian (1b).

The oldest well-recognized rocks of the Primordial period are the Acadian, or Ocoee (2a), which occur in Fannin, Murray, Gilmer, Pickens, Bartow, and Polk Counties. The Potsdam proper, or Chilhowee Sandstone (2b), is found in Murray, Bartow, Rabun, Habersham, White, Lumpkin, Dawson, and Harris Counties. Of the Canadian period, we find the three groups represented:

Calceiferous (3a). *Catoosa, Whitefield, Floyd,*

Quebec (3b). *Dade, Walker, Catoosa, Whitefield, Murray, Gordon, Chattooga, Floyd, Polk*

Chazy (3c). *Dade, Walker, Catoosa, Chattooga, Whitefield,*

*Quebec?* ~~Chazy~~ metamorphosed—parts of Rabun, Towns, Union, Fannin, Gilmer, Lumpkin, White, Habersham, Franklin, Banks, Hall, Dawson, Pickens, Bartow, Cherokee, Forsyth, Milton, Cobb, Paulding, Haralson, Carroll, Douglas, Fulton, De Kalb, Gwinnett, Jackson, Madison, Hart, Elbert, Lincoln, Wilkes, Oglethorpe, Clark, Walton, Coweta, Heard, Troup, Meriwether, Pike, Butts, Jasper, Morgan, Green, Taliaferro, McDuffie, Columbia, Hancock, Putnam, Monroe, Harris, and Upson Counties.

Trenton Period (4) is represented by the

Trenton Epoch (4a), *Dade, Walker, Catoosa, Whitefield, Murray, Gordon, Chattooga, Floyd, Bartow,* and Polk Counties:

Utica Epoch (4b).

Cincinnati Epoch (4c), *Whitefield, Gordon, Murray, Bartow, Floyd.*

Cincinnati metamorphosed, same as those in Quebec, besides Clayton, Fayette, Spalding, Henry, Rockdale, Jones, Newton.

Niagara Period (5).

Medina Epoch (5a). *Whitefield, Catoosa, Walker, Chattooga, Gordon, Floyd*

Clinton Epoch (5b), *Whitefield, Catoosa, Dade, Walker, Chattooga, Floyd.*

Niagara Epoch (5c). *Dade, Walker, Catoosa, Chattooga, Floyd, Gordon, Whitefield*

## DEVONIAN AGE.

## Hamilton Period (10).

Genesee Epoch (10b), Dade, Walker, Catoosa, Whitefield, Gordon, Floyd, Chattooga.

## CARBONIFEROUS AGE.

## Subcarboniferous Period (13).

Silicious Epoch (13a), Dade, Walker, Catoosa, Whitefield, Gordon, Floyd, Chattooga.

Calcareous Epoch (13b), Catoosa, Dade, Walker, Chattooga, and Floyd.

## Carboniferous Period (14)

Millstone Grit (14a), Dade, Walker, Chattooga.

Lower Coal Measures (14b), Dade, Walker, Chattooga.

Upper Coal Measures (14c), Walker. - *Dade Chattooga*

## REPTILIAN AGE.

Cretaceous (18), Muscogee, Marion, ~~Taylor~~, Chattahoochee, Stewart, ~~Webster~~, ~~Schley~~, Quitman, Randolph, *Clay*.

## MAMMALIAN AGE.

## Tertiary (19).

Eocene Epoch (19a), Clay, Randolph, *Taylor, Schley, Webster, New* Terrell, Sumter, Macon, Crawford, Bibb, Wilkinson, Washington, Glascock, Richmond, Burke, Jefferson, Scriven, Emanuel, Laurens, Pulaski, Dooly, Lee, Dougherty, Calhoun, Early, Miller, Decatur, Thomas, Mitchell, Colquitt, Worth, Irwin, Wilcox, Dodge, Telfair, Montgomery, Tatnall, Bullock, Effingham.

## Miocene Epoch (19b).

Pliocene Epoch (19c), Chatham, Bryant, Liberty, Appling, Coffee, Berrien, Brooks, Lowndes, Echols, Clinch, Ware, Charlton, Camden, Pierce, Wayne, Glynn, McIntosh.

## HUMAN AGE.

## Quaternary (20).

Drift Epoch, Muscogee, Talbot, Taylor, Crawford, Bibb, Baldwin, Hancock, Warren, McDuffie, Columbia, Richmond.

Champlain Epoch, Chatham, McIntosh, Glynn, Camden.

Terrace Epoch.

## SPECIAL GEOLOGY OF COUNTIES.

As an illustration of the general Geology of the State, typical counties may be selected in the different sections of the State, a detailed description of which will enable the reader better to understand the character of the whole.

For the non-metamorphic region in the North-west, *Dade* may serve as a type.

*Bartow* represents in its western two thirds the non-metamorphosed, and in the eastern one third the metamorphic.

*Fulton* represents the lower and western portion of the elevated Chattahoochee Ridge; while *Habersham* is a representative county of the eastern and higher portion, and indeed of all North-east Georgia.

*Bibb* is on the middle ground between the metamorphic, and Granitic in its northern half, and the Tertiary in the southern half, both of these formations being covered at their line of union by the sands and pebble-beds of the Quaternary.

*Muscogee* in a similar manner combines the granitic, the Cretaceous, and the Quaternary.

*Charlton* and *Ware* represent South-east Georgia.

*Clay County* combines Cretaceous and Tertiary, and shows the characteristic features of South-west Georgia.

#### DADE COUNTY.

The geological formations of *DADE* County represent those of all North-west Georgia, which consists of a series of ridges running north-east and south-west, with intervening valleys. These ridges are the remains of the folds which resulted from the earth's contraction at or after the close of the Carboniferous age, since we find the coal-beds lying approximately horizontal, or dipping toward the central line of the ridges which contain them; while the edges of the ridges are more elevated, showing, that as a consequence of the strain upon that portion which was most bent and which occupied a position about the central line of the valleys, breaks occurred, and the eroding effects of water have removed the beds of rock which once filled the valleys; so that in the middle of the valleys we find now the lowest and oldest rocks exposed to view.

The coal-measures remain on Sand and Lookout Mountains ~~only~~, while they have been removed by denudation, if they ever existed, from Taylor's Ridge, Chattoogata Ridge, John's Mountain, and the ridge extending north-east from Rome, east of and along the S. R. & D. R.R., and the one near Cassville.

Dade County embraces within its limits ten different geological deposits. In the north-west corner of the county

above the upper Dade is with  
probable explanation of metamorphism

(and of the State) we find Sand Mountain, originally a continuation of Raccoon Mountain in Tennessee, the summit of which is composed of sandstone. Below this lies the coal four or five feet thick; and this again underlaid by clay and shales with other seams of coal; and beneath these coal-shales, we find the subcarboniferous limestones and cherts. Through this limestone, as well as the beds above, water has found its way through rents and crevices in the rocks, and, in making its passage to the Tennessee River, near Shell Mound, has washed out Nickajack Cave.

Near the same station we find the bed of a creek, dry in summer and covered with large boulders of sandstone and limestone; and, following this up to its source, we come to the brow of the mountain, where the Dade Company's Coal-mine has been opened in one gulf, as it is called, and the Castle Rock Mine in another.

There are several of these gulfs, or nearly vertical excavations, made by water, in all of which the coal is exposed—the Perry, Boston, Tatum, etc. This coal underlies the whole of this mountain, and crops out again on the eastern side, near Trenton, etc.

The Dade Coal Company, consisting of ex-Governor Joseph E. Brown, John T. Grant, Julius L. Brown, W. C. Morrill, and W. D. Grant, of Atlanta, and Jacob Leaver, of Boston, have built a broad-gauge railroad five miles long, from Shell Mound on the Memphis and Charleston Railroad, to their coke-ovens at Cole City (74 in number.)

These ovens, as well as the freight-cars which carry the coal to Chattanooga, and even to Port Royal, S. C., are supplied by a narrow-gauge railroad, two miles long, whose cars ascend the mountain to near the summit by steam-power, and then, drawn by mules, enter the tunnel, at a slight inclination. On either side are passages leading to the rooms where 300 convicts from the State Penitentiary are at work, supplying light and warmth and motive-power to the people of the State.

There is another track now in construction, from near Cole City, up another gorge or gulf to the Castle Rock Mine, which will soon double the supply of coal, and especially that suitable for grates, being harder, and therefore bearing transportation better, without crumbling.

The coke made here compares very favorably with that made at Connellsville, Pa., and is used in preference at the Chattanooga and Atlanta Rolling Mills and at the Bartow Furnace, for smelting iron, and at Ward's Diamond Furnace for making Ferro-manganese. The company have expended \$400,000 in opening and equipping this mine.

The eastern side of this mountain presents a higher cliff, the waters of Lookout Creek cutting down, through the beds already mentioned, and also through the black Devonian shale, the Clinton iron ore, Medina <sup>limestone</sup> sandstone, Cincinnati shaly <sup>limestone</sup> Trenton limestone, and in the southern end of the valley near the Alabama line, the Chazy shaly limestone, the Quebec dolomite <sup>limestone</sup> and shale, and the calciferous sandstone.

The beds of coal are exposed at several places on the eastern side of Sand Mountain, as well as on the western side of Lookout Mountain.

Lookout extends from Chattanooga Tenn. to the Alabama line, in a south-west course for 20 miles, having its top nearly level, with the east and west edges somewhat elevated above the middle. A few miles from Chattanooga there is a crescent-shaped elevation, called Round Mountain, in which are found beds of coal, three or four feet thick, at Le Croy's and Greene's.

This flat region is well adapted to sheep-raising and Irish potatoes, and, with the cool breezes and magnificent views, is especially attractive as a summer resort. Capt. C. W. Howard, celebrated as a scientific agriculturist, has selected this from all the State as the most desirable spot to put in practice his knowledge of sheep husbandry.

On the Dade side of this mountain, the coal has been opened near the summit of the cliff in Johnson's Gulf, in a vein four or five feet thick, and an incline built by which the coal is brought down to the foot, and thence by a narrow-gauge railroad carried four miles to Rising Fawn Furnace, where 60 improved Belgian coke-ovens have been constructed for supplying fuel for their 50-ton stack, while the limestone and fossiliferous ore in inexhaustible quantities are in sight of the works, and a broad-gauge track of one mile delivers the pig iron at Rising Fawn Station on the Alabama and Chattanooga Railroad.

The productive farms of the valley furnish cheap subsist-

ence for workmen, and the climate leaves nothing to desire for residence. The thorough preparation and excellent construction of these works, furnished with the very best machinery, mark an era in Iron production in the State. They are owned by four New York gentlemen, who have expended \$600,000 in this enterprise; W. S. Wright, New York, President; Myer Myers, New York, Vice-President; Algernon S. Jarvis, White Plains, N. Y., Treasurer; Abram D. Delmars, Rising Fawn, Secretary.

The Cherokee Iron Works, built in 1864-5, by Dr. J. H. McLain, of Louisville, and Mr. Brown, of Philadelphia, are situated one mile north of Trenton. They were sold in April, 1876, to Mr. Amsby, of Philadelphia. The property embraces 500 acres of land.

The "Phoenix Furnace" Co. own 1,600 acres of land, and the foundation of a stack laid by the Empire Co., of which Dr. E. L. Strohecker, of Macon, was President. This property was sold for \$85,000, and is situated on the A. & C. R.R., three miles north of Rising Fawn.

There are three tan-yards in this valley, which can secure an unlimited supply of the best oak-bark. Pace's tan-yard is located at Trenton. Col. J. Cooper Nisbit, two miles south of Trenton, had a steam tannery, which was burned in 1873. Mr. Blevins has a tan-yard of 12 vats, one mile from Rising Fawn.

Dade Valley is well supplied with flour and grist mills. Mitchell Pope has one on a creek, two miles north of Morganville; Hook's or Lee's mill, with two run of stone, is at Wildwood; Wilkerson's mill, with two run of stone, is at Trenton; Silton's mill, with two run of stone, is at Trenton; Cureton's mill, with two run of stone, three miles north of Rising Fawn; Stevens' mill, with two run of stone, three miles south of Rising Fawn; Blake's mill, with two run of stone, four miles south of Rising Fawn.

Besides the opening from which the Rising Fawn Co. obtain coal, it has been found and opened by them on Lot 182. There has also been opened the "Hannah Bank," two feet thick, on Lot 44. The Phoenix Company opened on the Daniel Lot, No. 70; also on Lot No. 73.

In the Trenton Gulf, one half mile below the union

of the two creeks, which form here a most beautiful waterfall, coal has been found, 50 feet above the bed of the creek. In Forester's Gulf Creek, good coal is found, three feet thick ; on Mr. Tatum's land is also found coal on Lot 171.

Near what is known as the Stevens' trail is another outcrop; and on the Sulphur Springs trail is still another.

#### BARTOW COUNTY.

This has been selected as the second typical county of the State, for the reason that the Etowah River, which divides it into two unequal portions, cuts through (in a direction from east to west) the geological formations which strike nearly north and south, giving thus a section which shows, at the mouth of Stamp Creek, the Ocoee conglomerate of Safford's section along the Ocoee River on the Tennessee line, which is equivalent to the Acadian of Canada. Then it crosses the Chilhowee sandstone of Tennessee, of Potsdam age.

Next comes the Knox sandstone or Calceiferous of New York.

Then the Knox dolomite and shales, or Quebec.

Then the Maclurea limestone, or Chazy.

~~Next comes the Trenton limestone.~~

~~Then the Nashville or Cincinnati.~~

The geological structure of Bartow County is peculiar, it being situated on the line of metamorphic action which has given such a variety in the physical features as well as in the soils of Georgia. In the north-western portion of the county we find the cherty ridges of Silurian age, underlaid by limestone of the same age, both belonging to the lower division of that formation, and differing remarkably in one important particular as bearing upon the agricultural interest. The chert ridges are very dry, in some portions of them no water being attainable in wells of ordinary depth, so that, during the last summer, farmers in that section were compelled to haul water from a distance. The limestone valleys on the other hand, abound in springs of the largest size ; that at Mr. Lewis's, three miles from Adairsville, furnishing water not only for an excellent spring and milkhouse, but, at a short distance from its source, for a mill or gin.

*descending*

Next in order in the geological series comes the sandstone which not only furnishes the hearths for furnaces and walls for limekilns, but the ores of iron contained in it supply every variety of the best brown hematite for a tough iron, suited to the manufacture of ploughs and trace-chains, and from which the Atlanta Rolling Mill is now making steel-capped rails to supply the railroad transportation needed by this rich county; which has no less than three well-equipped roads traversing it already, while two others are in contemplation. Beds of manganese are also found, which are used, in combination with the iron, for the beautiful white crystalline, mirror-like pig-iron called by the Germans "Spiegeleisen." In this belt also we find an immense bed of Baryta used in white paint. Slate also is found within the borders of Bartow, on the slopes of the Pine Log Mountains, which form the dividing ridge between her and Cherokee, and whose rugged summit—Bear Mountain—towers aloft above all the surrounding country, and on which the United States Coast Survey has established a station for the triangulation of the continent.

Beyond this high land we find the quartz-veins of the metamorphic region abounding in gold; also, in the ridges, the Itacolumite or flexible sandstone, the well-known matrix of the Diamond. Rich and rare as these precious jewels are, they do not so reward the laborer as the rolling red lands around Cartersville, or the deep and fertile alluvial soils of the Etowah, from which the inhabitants have always drawn a bountiful support since the days of the Mound-Builders, who have left their monument and the bones of their forefathers on the choicest of all these farms, that of Lewis Tumlin.

Churches and schools and villages are dotted over the surface of this county.

The vegetation of this county is varied as the geological formations, and the kinds of soil resulting from the decay of different rocks. Of forest growth, we find the Walnut, Hickory, Ash, Elm, "Poplar," Maple, Sycamore, Wild Cherry, Sweet Gum, Oaks (White, Spanish, Black Jack), Chestnut, Pine (short leaf), and Persimmon.

This is an incomplete list of the woods of this county, as is that of Fulton which follows.

## FULTON COUNTY.

This county presents little variety in its geology or topography, having only a small representation of the Cincinnati gneisses and the reddish and gray hydro-mica schists, with some outcrops of the Steatite and Itacolumite of Quebec age.

The general surface of the county is hilly and rolling; though in some places the granite masses project above the surface. Some of the Quebec rocks in the northern part of the county are gold-bearing; and in one place in the Cincinnati group, large quantities of Iron Pyrite with some copper have been found. Asbestos in considerable quantity has been mined within three miles of the city of Atlanta.

As a railroad centre, its chief city, and the Capital of the State (Atlanta), has been located from geological causes. It is the lowest point of the Chattahoochee Ridge which could be conveniently crossed from Cartersville—the termination of the Appalachian range of mountains to the Atlantic. Its position on the water-shed between the Flint and Ocmulgee Rivers, and also on that of the Chattahoochee and the streams flowing into the Atlantic, have made it a great *entrepôt*. The timber supply of this county consists of Red Oak, White Oak, Post Oak, Black Jack Oak, Hickory, Chestnut, Poplar, Dogwood, Sassafras, Beech, Maple, and Red Elm.

## HABERSHAM COUNTY.

Habersham may serve as a characteristic county of the metamorphic section of the State. It extends from the South Carolina line to the Chattahoochee River from east to west, and from the Blue Ridge to the Chattahoochee Ridge from north to south.

Tray Mountain, 4,435 feet in height, is on the northern border, and Currahee, 1,740 feet in height, near the southern. The Tallulah River forms the boundary between Habersham and Rabun, near the mouth of which are the most noted falls in the State.

Toccoa Falls are near the Air-Line Railroad in the southern part of the county.

The Air-Line Railroad traverses the county from east to west, and the Elberton Air-Line Railroad is graded from Toccoa City southward, through Franklin, Hart, and Elbert counties, to Elberton.

There are represented in the county three different geological periods. The Tallulah Mountain consists principally of the sandstone of Potsdam age ; the Blue Ridge and the Chattahoochee Ridge are of Cincinnati age ; the valleys between are of Quebec age.

The natural growth on the land is generally a good indication of its value for agriculture. It may be, however, that the trees send their roots so deep into the earth that they derive sufficient nourishment from a depth to which the roots of small grain plants may not penetrate, while the surface may be so covered with quartz fragments that no material is furnished for the grain sowed upon it. In a large portion of the metamorphic region, the soft hydro-mica schists have been penetrated by veins of quartz ; and, during the long period of erosion to which they have been subjected, the soft material has been removed and the insoluble quartz fragments from the vein have fallen down until they finally almost entirely cover the surface. The same result has been reached in other formations, where a hard material, and one not easily decomposed, is found interstratified with one which is soft and easily disintegrated by atmospheric action.

The Itacolumite and sandstones, by their crumbling, furnish a light silicious soil, which produces well, so long as the vegetable matter which has fallen upon it, by its decay, furnishes the necessary nutriment ; but so soon as this is exhausted, they become quite barren and are easily washed.

The limestone rarely comes to the surface in this section ; indeed a few spots in Hall and Habersham are the only places where it has been found. It has, however, once existed on the surface in a band, continuing along the whole northern slope of the Chattahoochee Ridge ; and although now covered up by other rocks, the remains of that portion which has been removed by denudation from this belt have given character to a large portion of the soil, and the approximate locality may be distinguished by a better growth of forest-trees.

In some portions of Habersham, the impure limestones of the

Quebec group—generally dolomitic—have been converted by the metamorphism which has affected this whole region into soapstone and serpentine, and sometimes into calcareous mica schists; and, in the decomposition of all these rocks, an abundance of lime and magnesia is furnished to the soil.

In the eastern part of Habersham, a great portion of the surface consists of large granite veins; and these by their decomposition furnish a soil rich in potash, having the proper proportion of sand and clay.

The Hornblende schists decompose into a reddish clay soil which is quite fertile and lasts well.

Trap dikes occur near Toccoa City, generally in the form of exceedingly hard and tough, very dark and heavy rounded masses, which it is difficult to break with the hammer; sometimes these seem to be less perfectly solidified, and are gradually acted upon by the atmosphere, so that the iron in them is converted into the peroxide on the outside, and the change may be seen gradually progressing toward the centre of the mass, until finally the whole becomes soft and gradually breaks down into a rich red soil, containing a good proportion of potash.

While Potash, Lime, and Phosphoric acid are recognized as the constituents which contribute most to the fertility of the soil, and Alumina and Silica are looked upon as the basis of all durable soils, it is a noticeable fact in Georgia that the red soils—those containing a large percentage of hydrated peroxide of iron—are among the most fertile and durable. This is partly due to the fact that these red soils always contain a good proportion of clay, which acts as a retainer of moisture and an absorbent of ammonia and other soluble salts. There is also usually a good supply of lime in such soils.

Still it seems that the iron itself, although entering only to a slight degree into the composition of the ash of plants, exerts a beneficial influence, physically, on the soil, by its absorbent properties like those of alumina, and, by reason of its dark color, is an absorbent of the sun's rays, and hence promotes germination. In addition, it may exert some influence on plants similar to that which it is known to have on animals. Although but a small amount of iron is found in the human frame, and that principally in the blood, yet no fact is more

clearly recognized by physicians than that there can be no health so long as the blood is wanting in the red corpuscles which give color to the blood ; and no medicines are more frequently used for their tonic effect than the various preparations of iron.

#### MUSCOGEE COUNTY.

The Indian nation whose name is perpetuated in that of this county, according to tradition, gave the name, meaning Creek, to the country north and east of the Chattahoochee (or flowered stone, *Chatto-hoche*, from a rock said to be found above the falls in the river), on account of the number of streams in that country. The whites have well located the name in this county, as the water-power furnished by the falls near Columbus is as important to them as were the creeks to the Aborigines.

The soils of the county are not generally fertile, since the upper portion is hilly and made of very old and hard rocks. Below these, the surface is covered with the sand of the newest or drift formation. In the southern portion of the county, sandy marls are found in the banks of the creeks.

There may be distinguished four kinds of soil in the county: Post Oak lands, with Hickory, White Oak, and Pine, producing per acre 15 bushels of Corn, 7 to 10 of Wheat, 800 to 1,000 lbs. of Cotton ; Red uplands, 12 to 15 bushels of Corn and 500 to 800 lbs. of Cotton, with a growth of Hickory, Red Oak, and Pine ; Bottom lands are timbered with Hickory, White Oak, Red Oak, Poplar, Gum, Beech, and Walnut ; and Piney woods with the long-leaf Pine, producing five to seven bushels of Corn, and 300 to 700 lbs. of Cotton per acre.

#### ESTIMATED AGGREGATE OF WATER-POWERS OF MUSCOGEE COUNTY.

Chattahoochee River, from the top of Clapp's Dam to the boat-landing in Columbus, has, at low water, about 30,000 horse-powers. Above this point to Harris County, there is probably 12,000 horse-powers. This stream represents the water-powers of the county. Upatoi and Bull Creeks each have a considerable flow of water in them, but their natural fall is

very little, and they fill with sand so rapidly that it makes them undesirable for manufacturing purposes.

On the north side of the county, there are numerous branches, which descend rapidly from the metamorphic formations into the level sandy or post-tertiary country below. These can be used to advantage for driving light machinery requiring from two to twelve or eighteen horse-power. The aggregate available horse-power of this county is between 40,000 and 50,000.

#### CHARLTON AND WARE COUNTIES.

These counties, in the south-eastern corner of the State, present features entirely different from those of the four counties already described. They are bounded by the Suwanee, Satilla, and St. Mary's Rivers and the Florida line, and embrace nearly the whole of the Okefinokee Swamp, besides large areas of sandy land covered in part with wire-grass, and in part by long-leaf pine and palmetto. The upper portion is crossed by two railroads which intersect near Tebeauville—viz., the Atlantic and Gulf Railroad, extending from Savannah, to Bainbridge in the south-western corner of the State, and the Brunswick and Albany Railroad, extending from the fine harbor of Brunswick, west to Albany on the Flint River. These roads depend mainly for their freight on the boundless forests of long-leaf pine which lie on either side of them along the whole extent. Immense quantities of lumber are yearly carried to the seaports by these roads, and thence shipped to Northern, European, and South American markets. Turpentine plantations have been opened near most of the stations, and the distilleries produce thousands of barrels of turpentine and resin.

The Satilla and St. Mary's Rivers also furnish outlets for great rafts of lumber of every size, from whole trunks for masts, down to the smallest timber for shingles and laths. Steam mills are at almost every railroad-station, and quite a number along the rivers.

There are three well-marked and characteristic soils in this section : (1) a light, sandy, thin, poor soil, covered with saw palmetto, and full of roots ; (2) the loose, dark, sandy soil,

containing a large amount of vegetable matter ; and (3) the reddish, clayey soil. The first is adapted to the production of Potatoes and Ground Peas ; Cotton is successfully cultivated in the second ; while the third excels in the Sugar-Cane. Corn yields wonderfully on the darkest soils, especially when fertilized by the black swamp-muck, which is found in inexhaustible quantities in the ponds and small swamps scattered here and there throughout the section. The Okefinokee contains, over a large portion of its bed, this rich vegetable mould, sometimes to the depth of four feet. Along the banks of the Satilla River, there crops out a pure white marl, almost entirely consisting of carbonate of lime, which readily decomposes this muck, and fits it for plant food.

A considerable area in the swamp bears cypress-trees, which are nowhere excelled in size, one of which would yield thousands of shingles ; and there is the Pine and the white and red Bays. The last of these take a fine polish, and would apparently be valuable for furniture and cabinet-making. The islands in the swamp—Floyd's, Billy's, Honey, and Black Jack—are covered with pine and palmetto on their higher portions, where the soil is white and sandy, but still produces a luxuriant growth of long, tender grass, on which deer and wild cattle keep fat the year round.

On the borders of these islands there is a low hammock land which sustains a vigorous growth of Magnolia, Oak, etc., in a rich, sandy soil. Outside of this are dense thickets of small shrubs, almost impenetrable, except where wildcats and bears have made their trails ; and beyond these thickets which sometimes give place to a perfect mat of bamboo briers 10 feet high, many of them an inch in diameter and armed with thorns which stick like daggers, we find an open marsh filled with long rushes and water-lilies, whose thick roots afford the only support for the feet in wading through the soft ooze and mud, which yields to the weight of a man, so that he sinks to the arm-pits in many places. Many small islands and clumps of trees dot these "prairies," as they are called ; and these are generally surrounded by a floor of moss, which is sometimes firm enough to hold one's weight, and again forms a floating surface over the water ; and while it does not break through beneath the feet, one can see it sink and rise for 10 or

20 feet around at every step ; hence its name—Oke-fi-no-kee, or Trembling Earth. The Cassino, Holly, etc., are the principal trees. In some portions, Live Oak is found on drier spots.

In the prairies are many open holes, free from vegetation and several feet in depth ; and in these are found alligators, sometimes 10 to 12 feet in length ; while otters are more numerous along the streams which connect the main open prairies with Billy's Lake and the Suwanee River. This lake is about four miles in length, from 100 to 300 feet in width, and from four to eight feet in depth, perfectly clear (at the time of our visit in November), and abounding in the finest trout and jack fish, which even spring into the boat at night when a light is carried. In summer, hundreds of alligators may be seen sporting their unwieldy forms, while ducks and other water-fowl are found in the greatest numbers. Just at dusk, white herons may be seen settling in the trees on the banks of the small lakes, until they look like a solid white wall. Occasionally a goose is heard, uttering his melancholy croak as he flaps his broad wings just out of reach of the hunter's shot. A few squirrels are seen in the more open woods on the islands, while owls make the night hideous with their hooting. Some large moccasins are found in the morass.

The general level of the swamp is from 114 to 120 feet above tide-water at Trader's Hill on the St. Mary's, and the level on the line seen by Mr. Locke directly across the swamp, from Mixon's Ferry on Suwanee River to Trader's Hill, shows that almost all of the fall from the swamp to the river is within two miles of the eastern border. Indeed, there is only a narrow ridge running for miles between the swamp and Spanish Creek, and it is reported by the citizens that in times of very high water in the swamp, it actually empties a part of the excess of water across the ridge into the creek named.

A partial survey shows that there would be no engineering difficulty in draining the whole swamp perfectly, and rendering available the enormous amount of cypress timber as well as thousands of tons of muck, which, with the aid of the Satilla marls, would convert the sandy as well as the red-clay lands in the border, into market-gardens.

Oranges and Bananas are produced to some extent, but the

same care has not been devoted to them as in the neighboring counties of Florida.

Near Waycross, experiments have been made showing that the soils of that region are admirably adapted to the culture of fruits, figs and grapes. Watermelons can be grown in any quantity desired, and of any size that the consumer may choose.

This region of country was formerly looked upon as utterly worthless, so that when the citizens of Savannah projected a road through it to the Gulf, the name of "Cuyler's Desert" was applied to it.

I have seen no section of Georgia in which the people seem to secure a comfortable supply of food with less effort, and can see no reason why the whole country may not be made equal, if not superior, to that section of Prussia where Frederick the Great founded the city of Berlin, from which capital, within this decade, terms have been dictated to the continent of Europe. There is the greatest similarity in the soil and topography of the two sections, and should the tide of German emigration be turned hither, there would soon be realized to them the comforts and pleasures of the Fatherland.

In the continuation of this sandy belt toward the west, near Thomasville, a German, Mr. John Stark, has made, in one year, 1,800 gallons of wine, which, to my taste, equals the famed vintage of 1857 on the Rhine, and his sparkling wines will bear favorable comparison with Longworth's Catawba, from the vine-clad hills of the Ohio.

Nowhere in Louisiana have I seen the Sugar-Cane grow more luxuriantly, or yield a greater amount of saccharine juice than in this same belt of country.

For sheep farms, the grazing is naturally supplied, and no shelter would be needed in winter.

As an evidence of the healthfulness of the region, the State Board of Health has searched in vain for a practising physician in a whole county.

#### SURVEY OF OKEFINOKEE SWAMP.

Colonel R. L. Hunter, on October 21st, 1857, made a report to Governor H. V. Johnson, of a "survey of Okefino-

kee Swamp, with a view to ascertain the practicability of its drainage, the cost of the same, etc.”

This survey began on December 3d, 1856, and ended April 3d, 1857, and was conducted with the assistance of M. B. Grant and C. M. Forsyth, and cost \$3,260, including partial pay of the engineer in charge. There was furnished to the Governor a map of the swamp, with the elevation around the whole swamp and lines of ditches, which it was estimated would drain the swamp at a cost of \$1,067,250. This map was lost during the war, and it is only due to the enterprise of Colonel E. Y. Clarke, editor of the *Atlanta Constitution*, that a copy of Colonel Hunter's report has been hunted up and preserved, which, with verbal information furnished by Colonel Hunter himself, has materially aided the preparation of a map of the swamp.

On November 4th, 1875, by direction of Governor J. M. Smith, the party of the Geological Survey operating in Southern Georgia, joined the “Constitution Expedition” organized by the proprietors of the paper of that name in Atlanta, and remained until December 14th. A line of levels was run by Mr. C. A. Locke, Engineer of the “Survey,” from Mixon's Ferry on Suwanee River to Trader's Hill on St. Mary's, showing the following elevations referred to ebb tide :

	Fect.
Trader's Hill, on St. Mary's River.....	—
Water Surface at Mixon's Ferry.....	107.306
Bench B, in Pocket.....	122.097
“ D, “ .....	120.373
“ F, “ .....	121.269
Swamp between Pocket and Jones' Island .....	116.517
Jones' Island.....	121.401
Swamp between Jones' Island and Billy's Island.....	116.416
Billy's Island.....	118.009
Bench J, Billy's Island.....	123.839
Camp Lee, Billy's Bench.....	125.637
Billy's Lake, Water Surface... ..	115.991
Swamp E of Billy's Island.....	118.995
Two miles from Billy's Island on Little Trail.....	119.326
Prairie West, Side-water Surface.....	121.241
Roddenberry's House, East side.....	153.351
Long Branch, two miles from Roddenberry's House.....	55.092
Trader's Hill.....	79.045
Water Surface, St. Mary's River.....	5.000

A map was prepared by Mr. M. T. Singleton, Assistant Engineer of the Geological Survey, showing the location of this line, as well as of other lines run by the compass and measured through the swamp by Mr. Locke and Mr. Pendleton, from Black Jack Island in the southern portion to Honey Island south of Billy's Island ; then to Billy's Island (called Pendleton's trail, from Mr. Charles Pendleton, of Valdosta, who accompanied the party); thence to Floyd's Island north-east ; and thence north-west to Hickory Hammock, near the northern border, by Mr. Singleton and Mr. Loughridge, called Haines' trail from Mr. George Haines of Jesup, who furnished the laborers who cut out the way.

On this map are also entered the lines run by Colonel Hunter, and the residences around the swamp, so far as ascertained. I am indebted to Colonel Hunter for the following facts from his survey :

The line of levels which was run around the whole swamp, and connected with the water in the St. Mary's River near Trader's Hill, furnishes the following information in regard to the elevation of the surface at different points :

The highest part of the swamp is its northern extremity, where it is  $126\frac{1}{2}$  feet above tide-water. Coming south, in six miles it descends five feet, and then in thirteen miles from the last point it descends only one and a half feet on the east side—it being at that point (Mr. Mattox's) 120 feet above tide-water ; while at an opposite point on the west side (the mouth of Surveyor's Creek) it is only  $116\frac{1}{2}$  feet.

A nearly uniform descent continues from Mr. Mattox's to the south-east corner of the swamp, where the elevation is  $116\frac{1}{2}$  feet, while near Ellicott's Mound, where the branch of the St. Mary's runs out of the swamp it is only  $111\frac{1}{2}$  feet.

From the mouth of Surveyor's Creek to the extreme western angle of the swamp, it falls scarcely any, but on turning eastward toward the Suwanee River, it gradually descends, and where that stream comes out of the swamp it is only about  $110\frac{1}{2}$  feet above tide. At the north-east point of the Pocket it is  $114\frac{1}{2}$  feet. From that point it falls toward the place where Cypress Creek runs out, where it is about  $111\frac{1}{2}$  feet. Then it rises to  $118\frac{1}{2}$  feet when half way to the St. Mary's, and gradually falls again to it.

## ELEVATIONS.

The mountains of Georgia are of different geological ages, and composed of different rocks on their summits.

The most ancient and the least known are of Potsdam age, and consist of heavy sandstone masses, the Cohutta being a representative of the western prong of the Blue Ridge chain, and Tallulah and Yonah of the Eastern prong.

Second in age we have Bell, Sawnee, Graves', Jack's, Alcova, Pine, and Oak Mountains of Quebec age, and consisting largely of Quartzite, Itacolumite, and Sandstone.

Third in age are the Blue Ridge proper, represented by the high points of Rabun Bald, Enota, Blood, Amicalola, and Grassy Mountains, and the Chattahoochee Ridge, with its highest peaks at Mount Airy and Currahee, and consisting on their tops of hard hornblendic Gneiss of Cincinnati age.

Fourth in age are Sand, Lookout, and Pigeon Mountains, which are covered with a heavy bed of sandstone of carboniferous age. ~~Missionary, Taylor's, John's, and Chattoogata~~ Ridges are of ~~Quebec cherts.~~ *Niagara Sandstone*

The following are the elevations (by U. S. Coast-Survey measurements) of prominent mountains in North Georgia:

Enota, in Towns County, is.....	4,796 feet high.
Rabun Bald, in Rabun, is.....	4,718 " "
Blood, in Union, is.....	4,468 " "
Tray, in Habersham, is.....	4,435 " "
Cohutta, in Fannin, is.....	4,155 " "
Yonah, in White, is.....	3,168 " "
Grassy, in Pickens, is.....	3,090 " "
Walker's, in Lumpkin, is.....	2,614 " "
Pine Log, in Bartow, is.....	2,347 " "
Sawnee, in Forsyth, is.....	1,968 " "
Kennesaw, in Cobb, is.....	1,809 " "
Stone Mountain, in De Kalb, is.....	1,686 " "
The Capitol Tower in Atlanta, Fulton County, is	1,164 " "
Academy Hill, in Gwinnett, is.....	1,139 " "
Alcova, in Walton, is...	1,088 " "

Besides these easily recognized mountain ranges, there are other elevated ridges which form the water-sheds, separating the drainage areas of the different rivers.

The Blue Ridge—the highest mountain chain—divides the waters flowing into the Tennessee from those of the Savannah flowing to the Atlantic, on the one hand, and those flowing to the Chattahoochee and the Gulf of Mexico on the other. The Cohutta Mountains separate the Tennessee waters from those forming the Coosa, and the Dug Down Mountains separate these latter from those of the Tallapoosa, which, in Alabama, unites to form the river of that name; and in like manner the Kennesaw range separates those of the Etowah from the Chattahoochee.

Another ridge on which is built the Atlanta and West Point Railroad separates the Flint from the Chattahoochee; and still another, on which the Atlanta and Macon Railroad runs for 100 miles, separates the Flint from the Ocmulgee, and divides near Vienna into two prongs, one of which separates the Flint from the Withlacoochee, Allapaha, and Suwanee; the other separating these from the Satilla and St. Mary's, and extends south-east in the direction of the peninsula of Florida.

It is noteworthy here that the actual water-shed has not been determined; for the line of direction which no doubt once was continuous by the south-west corner of the Okefinokee Swamp is not now the water-shed, but a great curve is made, embracing the whole of the swamp in the Suwanee drainage, excepting a small portion in the south-east, which furnishes one feeder to the St. Mary's River. It then returns to a point in the line of the main direction near the Florida line, and continues south-east into that State.

The Georgia Railroad from Augusta to Union Point is on another ridge dividing the Ogeechee (a tributary of the Altamaha), and Brier Creek (a tributary of the Savannah), from Little River, another tributary of the Savannah; while from Union Point to Athens and Bellton the Air-Line Railroad divides the Broad River of the Savannah system from the Oconee of the Altamaha system.

The Altamaha River system has for its tributaries the Ogeechee, Oconee, and Ocmulgee; and these three receive, above the line of railroad from Augusta to Macon which runs along the southern border of the metamorphic rocks, a multitude of tributaries, which form a perfect network south of

the Chattahoochee Ridge, between the Atlanta and Macon Ridge, and the Bellton, Athens, and Union Point Ridge.

As the difference of level between the two limits north and south, mentioned above, will average 700 feet, and the distance not much over 70 miles, and the streams run directly across the different formations alternately made of hard gneisses and granites and soft hydromica schists and friable sandstones, numberless waterfalls are produced, and an almost incalculable water-power is furnished. This indeed is the case across this whole central belt of the State; limited by the Chattahoochee Ridge, on which the Air Line and the Atlanta and West Point Railroads run, on the north; and Columbus, Macon, and Augusta roads on the south limit of the metamorphic region, embracing a territory 200 miles long and 70 miles wide, or 14,000 square miles, with a slope averaging 10 feet per mile, and in a region where the rainfall averages 50 inches per annum, and where the climate is mild and equable the whole year.

No country in the world offers greater natural advantages than this section of Georgia for manufacturing establishments, especially for Cotton, which grows in abundance, and in easy reach of railroad transportation at any point—no less than 10 different railroads crossing this territory, north and south, and east and west.

Another remarkable feature in the drainage system is noticeable on the southern slope of the Blue Ridge, where the range averages 3,000 feet, and declines to an average of 600 feet in the Chattahoochee Valley; and the streams run directly across the gold-belt, which is continuous and inexhaustible, only needing the supply of water from the ridge, properly directed and controlled, to return a yield of the precious metal which should satisfy the most avaricious stockholder in a mining company.

The following are elevations of points on the lines of railroads in Georgia:

*Western and Atlantic (State) Railroad from Atlanta to Chattanooga.*

STATION.	DISTANCE. MILES.	ELEVATION. FEET.
Atlanta .....		1,050
Chattahoochee River.....	8	762
"    Bridge.....	8	832
Marietta.....	20	1,132
Railroad Summit.....	23	1,156
Kennesaw Mountain.....	23	1,828
Acworth .....	34	932
Allatoona Creek.....		805 (about)
Allatoona .....		875 (about)
Etowah River.....	47	696
"    Bridge.....		771
Kingston.....	60	721
Adairsville.....	70	723
Calhoun.....	80	653
Oostenaula River.....	85	623
"    Bridge .....		655
Dalton.....	100	773
Tunnel Hill.....	107	859
Summit Ridge.....		932
Ringgold.....	114	776
Tennessee Line .....		714
Chattanooga.....	138	663

*Macon and Western Railroad (Atlanta to Macon).*

	MILES.	FEET.
Atlanta.....		1,050
Rough and Ready.....	11	1,004
Jonesboro.....	21½	905
Fosterville.....	28	960
Griffin .....	48	975
Milner .....	54	863
Barnesville.....	61	875
Forsyth.....	77	735
Prattsville.....	85	625
Depot at Macon.....	102	414
Low Water, Ocmulgee River.....		263

*Central Railroad (Macon to Savannah).*

STATION.	DISTANCE. MILES.	ELEVATION. FEET.
Ocmulgee, low water.....		263
East Macon Depot.....		297
Griswold.....	10½	464
Gordon.....	20½	343
MacDonald.....	30½	245
Emmit.....	38½	210
Oconee River.....		186
Oconee.....	42½	221
Tennille.....	55½	
Davisborough.....	67½	291
Spears.....	78¾	238
Sebastopol.....	90½	190
Herndon.....	100½	174
Millen.....	110½	158
Paramore's Hill.....		233
Scarborough.....	120½	148
Ogeechee.....	129	106
Halcyondale.....	140½	110
Little Ogeechee, in Scriven County.....		106
Egypt.....	150½	126
Guyton.....	160½	77
Eden.....	170½	34
Station No. 1.....	181½	19
Depot at Savannah.....		32

*Macon and Brunswick Railroad.*

A profile of this road could not be obtained, the original notes having been lost.

*Atlanta and West Point Railroad.*

	ELEVATION. FEET.
Atlanta.....	1,050
East Point.....	1,062
Fairburn.....	1,048
Palmetto.....	1,039
Newnan.....	985
Grantville.....	892
Hogansville.....	768
Lagrange.....	778
West Point.....	620
Chattahoochee River.....	600

*Atlanta and Richmond Air Line Railroad* (from Atlanta to Tugalo River).

STATION.	DISTANCE.		ELEVATION.
	MILES.	FEET.	
Atlanta.....		1,050	
Doraville.....	15	1,070	
Norcross.....	20	1,050	
Suwanee.....	31	1,037	
Buford.....	37	1,207	
Flowery Branch.....	44	1,122	
Gainesville.....	53	1,222	
Bellton.....	67	1,342	
Mt. Airy.....	80	1,588	
“ (by U. S. Coast Survey).....		1,610	
Toccoa.....	93	1,040	

*Georgia Railroad* (Atlanta to Augusta).

STATION.	DISTANCE.		ELEVATION.
	MILES.	FEET.	
Atlanta.....		1,050	
Decatur.....	6½	1,049	
Stone Mt.....	15½	1,055	
Lithonia.....	24½	954	
Conyers.....	30¾	909	
Yellow River.....		670 (about)	
Covington.....	41	763	
Ulcofauhatchee.....		674 (about)	
Social Circle.....	51¾	890	
Rutledge.....	59	728	
Madison.....	68	696	
Buckhead.....	75½	642	
Oconee River.....		514 (about)	
Greensboro.....	88	627	
Union Point.....	95	674	
Crawfordville.....	106¾	618	
Cumming.....	114½	647	
Camak.....	124	613	
Thomson.....	133½	531	
Dearing.....	142	489	
Berzelia.....	150½	517	
Bel-air.....	161	324	
Augusta Depot.....		147	
Savannah River.....		119	
Hamburg Depot.....		152	

*South Western Railroad (Macon to Albany and Fort Gaines).*

STATION.	FEET.
Macon Depot.....	332
Tobesofkee Creek Swamp.....	275
“ “ Track.....	290
“ “ Bridge.....	295
Bridge between Tobesofkee and Echaconnee Summit.....	379
Bridge proper.....	390
Seago's.....	360
1½ Byron's.....	513
2 Powersville.....	385
Fort Valley.....	528
Ridge at Stapp's Quarter beyond Indian Creek.....	505
Uniform Table-land to Marshallville.....	491
Winchester.....	463
Gradual descent to Flint River Bridge.....	290
Oglethorpe.....	299
Camp Creek Bridge.....	306
Andersonville.....	394
White Water Creek Culvert.....	361
Stewart's Turnout.....	474
Americus.....	360
Smithville.....	332
Kinchafoonee Bridge.....	275
Brown's Station.....	369
Dawson.....	352
Grave's Turnout.....	350
Nochway Bridge.....	292
Ward's Station.....	392
Bridge beyond Ward's.....	415
Pachitla Creek Bridge.....	342
Cuthbert Depot.....	446
Junction.....	484
Morris Station.....	242
Colman's.....	391
Fort Gaines Depot.....	163½
“ “ Bridge.....	190 (about)

*Macon and Augusta Railroad.*

STATION.	ELEVATION. FEET.
E. Macon.....	285
Low water, Ocmulgee River.....	241
Wolf Creek.....	415

STATION.	ELEVATION. FEET.	SURFACE.
Commissioner's Creek.....	422	
Summit between Com. and Fishing Creek.....	493	
Fortville.....	459	
Fishing Creek.....	373	
McCrary's.....	330	
Camp.....	231	
Milledgeville.....	264	
Tobler's Creek.....	255	285
Oconee River.....	269	214
Rocky Creek.....	350	315
Dry Pond Summit..	593	648
Town Creek.....	575	540
Sparta.....	545	
Two Mile Branch.....	488	458
Little Ogeechee.....	485	440
Culverton.....	537	
Dry Creek.....	488	453
Fulsom's Creek .....	375	365
Ogeechee River.....	375	
Long Creek.....	348	313
School-house Summit.....	525	550
Rocky Comfort.....	455	415
Golden Creek.....	453	428
Warrenton Depot.....	488	

ELEVATIONS IN GEORGIA, ASCERTAINED BY JOHN E. THOMES, C.E., IN MAKING A UNITED STATES RAILWAY SURVEY, FROM THE TENNESSEE RIVER THROUGH FISHER'S GAP, IN SAND MOUNTAIN, ALABAMA, TO THE ATLANTIC COAST OF GEORGIA, IN 1875.

The line of this survey enters Georgia in the neighborhood of the Old Burnt Village in Troup County, crosses the Thomaston branch of the M. & W. R.R., passes through Culloden in Monroe, Knoxville in Crawford, crosses the Ocmulgee above Hawkinsville, and passes through Eastman in Dodge County, and from there nearly follows the line of the M. & B. R.R. to Brunswick. The length of this line from the Tennessee River to Brunswick is 412 miles, over 250 of which is in Georgia. The elevations in feet above the sea level are as follows:

STATIONS.	ELEVATION. FEET.
Chattahoochee River.....	674
Maple Creek.....	745
Mountain Creek.....	743
St. Cloud Road.....	861
A. & W. P. R.R.....	930
Flint River.....	697
Concord.....	804
Elkins' Creek.....	711
Powder Creek.....	724
Potato Creek.....	669
Thomaston Branch R.R.....	804
*Tobler's Creek.....	661
Culloden.....	696
Knoxville.....	640
Rich Hill.....	619
Mill Creek.....	504
Muscogee & S. W. R.R.....	478
Ocmulgee River (low water).....	214
Hawkinsville Branch M. & B. R.R.....	336
Limestone Creek.....	250
M. & B. R.R., 134th mile P.....	391
Eastman.....	356
McRae Station.....	224
Sugar Creek.....	103
Lumber City.....	147
Ocmulgee River (low water).....	98
Hazlehurst.....	259
Carter's Creek.....	152
Coleman's Creek.....	146
Boggy Creek.....	93
Satilla.....	87
Atlantic and G. R.R.....	118
Pinholloway River.....	39
Buffalo Swamp.....	25
Ten-mile Creek.....	25
Brunswick Depot.....	16

On this line, Eastman is 112 miles, and Culloden 212 miles from Brunswick.



Rogers Creek.....	At mouth .....	7.00	.79	.63	20.00	16.00	13.00	Low water.	Locke.
Ktowah River.....	At mouth of Allatoona...	1307.7	147.68	118.14	15.00	2250.00	1835.00	Minimum	"
Pettis Creek.....	Mouth.....	20.00	2.67	2.13	5.00	12.00	9.60	"	"
Nancy Creek.....	" .....	6.00	.68	.50	5.00	3.00	....	Minimum	"
Two-Run Creek.....	Kingston .....	26.00	2.94	2.3	16.00	48.00	38.40	Low water.	Very low.
Conasaena Creek.....	" .....	5.00	.55	.44	20.00	11.00	9.10	"	"
Bareley's Creek.....	Near mouth.....	5.00	.55	.44	18.00	10.00	8.2	"	"
Allatoona Creek.....	2½ miles from mouth.....	25.5	28.50	22.80	17.00	48.4	38.8	"	"
Pumpkinvine Creek....	2 " " .....	70.00	7.95	6.41	10.00	80.00	64.0	"	"
Raccoon Creek.....	1 " " .....	39.00	4.54	3.63	10.00	45.60	36.5	"	"
Euharlee .....	2 " " .....	120.90	13.51	10.81	12.00	165.6	132.8	"	"
BIBB COUNTY.									
Ocmulgee River .....	Holt's Shoals.....	2917.00	321.37	265.09	3.70	1224.70	979.76	"	Estimated.
Walnut Creek.....	Macon.....	5.00	0.57	0.45	10.00	5.70	4.50	"	"
Swift Creek.....	7 miles, Macon.....	5.00	0.57	0.45	10.00	5.70	4.50	"	"
Stone Creek.....	8 " .....	8.00	0.91	0.72	12.00	10.92	8.73	"	"
Tobesofkee Creek.....	Freeman's Mill.....	70.00	7.98	6.38	20.00	159.60	127.68	Above "	"
BURKE COUNTY.									
McBean's Creek.....	Waynesborough R.R.....	50.00	5.70	4.56	10.00	570.00	456.00	Barrow.	Low flat banks.
Boggy Gut Creek.....	Shell Bluff.....	10.00	1.14	0.91	10.00	11.40	9.10	"	"
Sapp's Spring Creek....	Sapp's Mill.....	20.00	2.28	1.82	11.00	25.08	20.06	"	"
CARROLL COUNTY.									
Buffalo Creek .....	1¼ miles south of Carrollton.	6.00	0.68	0.54	10.00	6.80	5.40	Locke.	"
Briar Creek.....	3 miles, Carrollton.....	5.00	0.56	0.44	10.00	5.60	4.40	"	"
Panther Creek.....	4½ " .....	4.00	0.45	0.36	10.00	4.50	3.60	"	"
Buffalo Creek.....	1 mile above mouth.....	18.00	2.04	1.64	10.00	20.40	16.40	"	Estimated.

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one-foot head.	Available horse-power of one-foot head.	Approximate head or an assumed head of 10 feet.	Theoretical power of stream with this head running.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
CARROLL CO.— <i>Continued.</i>										
Snake Creek.....	Factory.....	42.00	4.70	3.76	30.00	141.00	112.80	Low spring.	Locke.	100 or more feet of head can be had.
Dog River.....	Above Watkins' Mill.....	25.76	2.92	1.60	10.00	29.20	16.00	"	"	Measurement unsatisfactory.
Cockrum's Creek.....	Old Cherokee and Carroll Line.....	4.5	.60	.48	10.00	6.00	4.80	"	"	Estimated.
Tallapoosa.....	Above mouth of Lake Creek.....	101.43	17.42	9.13	10.00	114.20	91.30	"	"	
Buck Creek.....	.....	16.60	1.81	1.45	10.00	18.10	14.50	"	"	
Indian Creek.....	South of Tallapoosa and near Bonner's.....	7.00	.79	.64	10.00	7.91	6.40	"	"	Estimated.
Whooping Creek.....	Dorris Mill.....	24.50	2.72	2.17	10.00	27.20	21.70	Flash or less.	"	
CHATHAHOOCHEE CO.										
Oswitee Creek.....	Bagley's Mill.....	6.00	0.70	0.56	18.00	12.60	10.08	Low spring.	"	
"	Romney's Mill.....	21.00	2.28	1.82	18.00	33.04	24.43	"	"	
Woolfolk's Branch.....	Woolfolk's.....	1.00	0.11	0.08	65.00	7.15	5.72	"	"	
Upatoi.....	.....	.....	.....	.....	12.00	.....	.....	"	"	Very sandy and full.
CHATTOOGA COUNTY.										
Little Turtle Creek.....	Near mouth.....	5.5	0.62	0.40	10.00	6.20	4.90		Barrow.	

Raccoon Creek.....	Lot 39.....	4.5	0.51	0.40	10.00	5.10	4.00	Barrow.
Rough Creek.....	Mouth.....	8.8	1.00	0.80	10.00	10.00	8.00	"
Arnuchee Creek.....	Subligna.....	41.5	4.73	3.78	10.00	4.73	3.78	"
CHEROKEE COUNTY.								
Mill Creek.....	Mouth at Canton.....	46.00	5.32	4.17	10.00	52.20	41.70	Low spring or more.
CLAY COUNTY.								
Chemochochobee.....	Weaver's Mill.....	60.00	6.84	5.47	30.00	205.20	164.16	Cubic feet estimated.
Pataula.....	Rapids.....	240.00	27.36	21.88	22.00	601.92	481.53	
CLINCH COUNTY.								
Suwanee River.....	Mixon's Ferry.....	72.00	7.95	6.38	10.00	79.5	63.80	Minimum low water.
COBB COUNTY.								Locke.
Big or Vickery's Creek.	Empire Mill.....	147.	16.76	13.4	16.0	268.1	214.52	Low water.
"	"	147.	16.76	13.40	30.00	502.80	402.24	Col. Robinson,
"	"	147.	16.76	13.40	14.00	224.6	187.7	R. M. Co.
Head of Nickajack.....	Jones' Mills.....	3.00	0.34	0.27	15.00	5.10	4.08	"
Nickajack.....	Ruff's Mills.....	....	....	....	20.00	....	....	Low spring.
"	Concord Factory.....	....	....	....	21.00	....	....	Locke.
"	Mill combined.....	....	....	....	50.00	....	....	"
Chattahoochee.....	Austell's Shoals.....	2000.00	286.20	180.96	10.00	2202.00	1809.60	"
Tributary Sweet Water.	Babb's Mill.....	2.00	0.23	0.18	15.0	4.14	3.32	Estimated.
Rotten Wood.....	Aker's Mill.....	35.00	3.97	3.17	32.0	127.24	100.78	"
"	Boring's Mill.....	38.00	4.30	3.44	10.00	43.00	34.40	Low water.
"								Almost any head to 50 obtainable.
"								"

Too full for measurement, has probably 20 cubic feet at low water.

Estimated.

Almost any head to 50 obtainable.

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one-foot head.	Available horse-power of one-foot head.	Approximate head of 10 feet.	Theoretical power of stream with this head running 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
<b>COBB Co.—Continued.</b>										
Soap Creek.....	At Paper Mill.....	62.00	7.40	5.92	67.00	495.8	396.64	Low spring.	Locke.	Head includes Robertson's Mill. There are two L. Willicos. " " " "
Little Willico....	Old Starch Factory.....	5.00	.57	.45	30.00	11.40	9.00	"	"	" " " "
"	At mouth, Willico Factory...	8.00	.908	.72	30.00	27.00	21.60	" or more	"	" " " "
Willico.....	Above Factory.....	21.60	2.45	1.96	31.00	75.95	60.72	Low spring.	"	" " " "
Powder Spring Creek..	Powder Spring.....	34.00	3.96	3.17	10.00	39.60	31.70	"	"	" " " "
Sweet Water.....	Hays' Bridge.....	80.50	9.00	7.20	10.00	90.00	72.00	Low water.	"	" " " "
<b>COLUMBIA COUNTY.</b>										
Kiokee Creek.....	Near Appling.....	30.00	3.42	2.73	10.00	34.20	27.30		Barrow.	
<b>DAWSON COUNTY.</b>										
Etowah River.....	Palmer's Mill.....	60.25	6.87	5.29	10.00	48.70	52.90		"	
Shoal Creek.....	Howzer's Mill.....	83.00	3.76	2.86	16.00	60.16	48.12		"	
Amicolala River.....	Dawsonville and Jasper Road.	103.60	11.80	9.44	51.00	590.00	472.00		"	
"	8 miles Dawsonville.....	85.00	9.69	7.75	10.00	96.96	77.50		"	
Head of Jones' Creek..	Foster's Mill.....	2.00	0.23	0.18	14.00	3.19	2.55		"	

DECATUR COUNTY.									
Limesink .....	2.00	0.23	105.00	24.15	19.32	Low spring.	Locke.	Creek disappears. Probably has more water.	
Barnet's Creek.....	23.00	2.62	10.00	26.20	20.90	"	"	Flow affected by mills above.	
Attopulgis Creek.....	18.00	2.05	10.00	30.50	16.40	"	"	Estimated.	
Martin's Mill Creek....	5.00	0.57	7.00	3.99	3.19	"	"		
Sunburn's Mill Creek....	8.00	0.91	10.00	9.10	7.20	"	"		
DE KALB COUNTY.									
Peachtree Creek.....	23.75	2.71	22.0	....	....	Low water.	"		
EARLY COUNTY.									
Harrod's Creek.....	20.00	2.28	35.00	79.80	63.84	Low spring.	"		
Colonochee Creek. ...	70.00	7.98	12.00	95.76	76.60			Estimated.	
ELBERT COUNTY.									
Beaver Dam Creek.....	30.00	3.42	10.00	34.20	27.20		Barrow.		
FLOYD COUNTY.									
Armuchee Creek.....	135	15.40	10.00	151.3	121.01	Low water.	Locke.	Stream a little above l. w.	
Lit. Fork Armuchee Ck.	41	4.67	15.00	71.1	55.95	"	"	"	
Big Fork Armuchee Ck.	48	5.47	10.00	54.7	43.7	"	"	"	
John's Creek.....	15	1.71	8.00	13.6	10.88	"	"	"	
Silver Creek.....	24	2.73	18.0	49.2	39.34	"	"	"	
Cedar Creek.....	70	8.00	10.0	79.8	64.0	Minimum	"	"	
						low water.	"		
Little Cedar Creek.....	20	2.28	14.0	31.9	25.50	"	"		
" " .....	60.80	6.92	10.00	69.20	55.41	Low spring			
						or more.			
Big Spring.....	7.98	.90	10.00	9.08	7.86	Low spring.			

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one foot head.	Available horse-power of one foot head.	Approximate head or an assumed head of 10 feet.	Theoretical power of stream with this head running 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
<b>FORSYTH COUNTY.</b>										
Beaver Run.....	Mouth.....	75 00	8.55	6.84	20.00	171.00	136.80	Flush.	Barrow.	
Sitting-Down Creek ..	Holbrook's Mill.....	30.00	3.42	2.73	7.00	23.94	19.15		"	
Etowah River.....	Franklin Mines.....	1129.00	138.70	102.96	8.00	1029.00	823.20	Low spring.	"	
Sitting-Down Creek....	Pool and Heard's Mill.....	30.00	3.42	2.73	15.00	51.70	41.36		"	
<b>FRANKLIN COUNTY.</b>										
Broad River.....	Toccoa and Carnesville Road.	50.00	5.70	4.56	10.00	57.00	45.60		"	
Creek.....	3 miles Carnesville.....	2.00	0.23	0.18	16.00	3.65	2.92		"	
Unawattee.....	4 " .....	50.00	5.70	4.56	10.00	57.00	45.60		"	
<b>FULTON COUNTY.</b>										
Peachtree.....	Atlanta and Buckhead Road..	97.50	11.07	8.85				Flush or lower.	Locke.	
Nancy's Creek.....	96 and 17.....	45.00	5.01	4.01				Low spring.	"	
Marsh Creek.....	73 and 17.....	5.00	0.57	.45				"	"	
Long Island Creek.....	164 and 17.....	6.5	.73	.58				"	"	Estimated.
<b>GLASCOCK COUNTY.</b>										
Sock's Branch.....	Mouth.....	6.00	0.68	0.54	18.00	12.31	9.84			

GORDON COUNTY.									
Oothcaloga.....	Calhoun Mills.....	41.36	4.71	3.76	9.0	42.39	33.91	Barrow.	
Connesauga.....	Mouth.....	293.0	32.10	25.68	10.00	321.00	256.80	"	
Cranata Springs.....	5 miles Calhoun.....	6.00	0.68	0.54	12.0	8.2	6.56	"	
Smoke Creek.....	Near mouth.....	5.00	0.57	0.45	10.00	5.70	4.50	"	
Coosawattie.....	Carter's Mill.....	541.0	61.70	49.36	50.0	3085.0	2408.0	"	
Talking Rock.....	At mouth.....	107.90	12.30	9.76	10.00	122.00	97.60	"	
Dry Creek.....	Lot 85.....	8.00	0.91	0.72	10.00	9.10	7.20	"	
Salacoo.....	117, 7, and 3.....	119.6	13.63	10.90	10.00	136.30	109.00	"	
Resaca Creek.....	Resaca.....	12.40	1.41	1.12	10.00	14.10	11.20	"	
Lick Creek.....	Lot 116.....	6.00	0.68	0.54	10.00	6.80	5.40	"	
Snake Creek.....	113 and 1.....	14.70	1.67	1.33	10.00	16.70	13.30	"	
Rocky Creek.....	14, 24, and 3.....	3.50	0.39	0.31	10.00	3.90	3.10	"	
John's Creek.....	53, 24, and 3.....	12.56	1.43	1.14	10.00	14.3	11.40	"	
GWINNETT COUNTY.									
Yellow River.....	Fain's Mill.....	60.0	6.84	5.47	20.0	136.8	109.4	Barrow and Locke	Estimated April 24th for low water.
"	Stedman's Mill.....	64.00	7.30	5.84	30.00	219.0	175.20	"	"
"	Montgomery's Mill.....	38.40	4.38	3.50	14.00	61.32	49.00	"	"
Wolf Creek.....	Near Montgomery's Mill.....	5.00	0.57	0.45	10.00	5.7	4.5	"	Or higher.
Suwanee Creek.....	Lawrenceville and Buford Rd.	11.85	1.34	1.07	10.00	13.40	10.70	"	"
Level Creek.....	Strickland's Mill.....	12.00	1.36	1.08	20.00	35.44	28.35	"	"
Ivy Creek.....	Hamilton's Mill.....	2.00	0.23	0.18	18.00	4.10	3.28	"	"
HABERSHAM COUNTY.									
Hazell Creek.....	Clarksv'le and Gainesv'le Rd..	31.85	3.60	2.88	8.00	28.80	23.04	"	Above l. w.
Soquee River.....	Clarksville.....	124.86	13.74	10.99	10.00	137.40	109.90	"	"
Shoal Creek.....	Crow's Mill.....	3.0	0.34	0.27	12.00	4.10	3.28	"	"
Tallulah River.....	Above Falls.....	458.5	51.27	41.01	400.0	20508.00	16406.40	"	"

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one-foot head.	Available horse-power of one-foot head.	Approximate head of an assumed head of 10 feet.	Theoretical power of stream with this head running 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
HABERSHAM Co.— <i>Cont.</i>										
Panther Creek.....	Weaver's Mill.....	19.37	2.22	1.76	30.00	66.66	52.22	Low water.	Barrow and Locke	Falls rapidly.
Rock Hazel Creek.....	Jackson's Mill.....	3.00	0.34	0.27	20.00	6.80	5.40	"	"	"
Mud Hazel Creek.....	Near mouth.....	8.85	1.00	0.80	10.00	10.00	8.00	"	"	"
Little Mud Creek.....	½ mile Hall Line.....	33.00	3.76	3.00	10.00	37.60	30.00	Above l. w.	"	"
Big Mud Creek.....	" " ".....	20.00	2.28	1.82	10.00	22.80	18.20	"	"	"
Ward's Creek.....	Jarrett's Mill.....	33.75	3.76	2.86	10.00	37.60	28.60	Flush.	"	"
Toccoa Creek.....	Toccoa Falls.....	5.20	0.60	0.48	190.00	114.00	91.20	Low spring.	"	"
Roper's Creek.....	Willbank's Store.....	5.00	0.57	0.45	10.00	5.70	4.50	"	"	"
Soque River.....	Hill's Mill.....	41.04	4.63	3.68	40.00	184.00	147.20	"	"	"
Sutton's Mill Creek....	Near Clarksville.....	16.80	2.00	1.60	10.00	20.00	16.00	"	"	"
Deep Creek.....	Near mouth.....	38.50	4.39	3.51	10.00	43.90	35.10	"	"	"
Creek.....	Near Batesville.....	3.00	0.34	0.27	9.00	3.07	2.45	"	"	"
Mathews' Mill Creek...	Mouth.....	1.50	0.17	0.13	22.00	3.76	2.86	"	Barrow.	"
Panther Creek.....	Walker's Mill.....	4.50	0.51	0.40	20.00	10.26	8.20	"	"	"
Nancy Town Creek....	At mouth of Cox's Creek...	5.29	0.60	0.48	10.00	6.00	4.80	"	"	"
Cox's Creek.....	Near mouth.....	2.00	0.22	0.17	100.00	22.00	17.60	"	"	"
Nancy Town Creek ...	Above Stack's Branch.....	2.80	0.32	0.25	15.00	4.78	3.82	"	"	"
Dick's Creek.....	Hulsey's Mill.....	3.32	0.37	0.29	30.00	11.30	9.04	"	"	"
Leatherwood Creek....	Hickery's Mill.....	0.75	0.03	0.06	14.00	1.20	0.96	"	"	"

Barrow.	5.10	0.58	0.46	10.00	5.80	4.60
Walton's Creek.....	Jarrett's Bridge Road.....					
Toccoa Creek.....	At mouth.....	16.00	1.82	1.45	10.00	18.20
Black Mountain Creek.....	Near mouth.....	1.25	0.14	0.11	10.00	1.40
Panther Creek.....	" ".....	53.63	6.11	4.88	10.00	61.10
HALL COUNTY.						
Chestatee.....	Leather's Ford.....	290.00	32.00	26.40	12.00	306.00
Yellow Creek.....	Near mouth.....	7.28	0.83	0.66	20.00	16.60
Big Wahoo Creek.....	Glade Mine and Leatherwood Ford Road.....	14.57	1.66	1.32	10.00	16.60
Middle Wahoo Creek...	Glade Mine and Leatherwood Ford Road.....	12.47	1.42	1.13	10.00	14.20
Little River.....	Glade Mine and Leatherwood Ford Road.....	12.64	1.44	1.15	10.00	14.40
Fiat Creek.....	Above Glade Mine.....	17.28	1.97	1.57	50.00	98.50
Chattahoochee River...	Shallow Ford.....	929.00	106.00	84.80	10.00	1000.00
North Fork Oconee.....	Spring Springs.....	22.37	2.54	2.03	10.00	25.40
" ".....	Carpenter's and Gainesville Rd	31.50	3.59	2.87	10.00	35.90
Candler's Creek.....	" ".....	9.60	1.10	0.88	10.00	10.9
Pigeon-Wing Creek.....	Month.....	2.00	0.23	0.18	10.00	2.30
Caney Fork.....	County Line.....	12.00	1.37	1.11	10.00	13.70
Walnut Fork.....	Harrington's Ford.....	15.54	1.77	1.41	20.00	35.40
Holly Branch.....	Month.....	2.50	0.28	0.22	12.00	3.42
Rocky Shoal Creek.....	".....	2.00	0.23	0.18	10.00	2.30
Allen's Fork.....	County Line.....	22.52	2.56	2.04	10.00	25.60
Pond Fork.....	Mangan's Mill.....	10.58	1.20	0.96	9.00	10.80
HARALSON COUNTY.						
Tallapoosa.....	Waldrop's.....	49.80	5.60	4.48	10.00	56.00
".....	McBride's Bridge.....	580.80	66.56	53.24	10.00	66.56
".....	Latham's Crossing.....	105.60	11.92	9.53	10.00	119.2
						95.30
						Low spring.
						Above " "
						" "

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one-foot head.	Available horse-power of one-foot head.	Approximate head of an assumed head of 10 feet.	Theoretical power of stream with 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
<b>HARALSON Co.—Cont.</b>										
Little River.....	Mouth.....	19.48	2.23	1.77	10.00	22.20	17.70	Above 1. sp.		A 30-foot dam would flood 70 acres or more.
Beach Creek.....	Rock House.....	30.50	3.31	2.64	10.00	33.10	26.40	Low water.		
Renfro's Creek.....	Near mouth, near Draketown	31.40	3.56	2.85	10.00	35.60	28.50	Above " "		Too full for measurement, has about 150 feet in spring months. Falls 60 ft. in $\frac{1}{4}$ mile.
<b>HARRIS COUNTY.</b>										
Mulberry Creek.....	Emery's Mill.....	....	....	....	60.00	....	....			Sand Beds. " " " " Shoals about 1 mile long.
Mountain Creek.....	River Road.....	63.00	7.18	5.74	20.00	143.60	114.88	Low spring or more.	Locke.	Shoals about 1 mile long.
<b>HEARD COUNTY.</b>										
Potato Creek.....	County Line.....	22.00	2.52	2.01	10.00	25.20	20.10	Low spring.	" "	Shoals about 1 mile long.
New River.....	$\frac{1}{4}$ mile mouth.....	136.08	15.68	12.54	10.00	156.80	125.40	" "	" "	
Chattahoochee.....	Lot 344 and 3d.....	3000.00	340.80	272.64	10.00	3408.00	2726.40	Low water	" "	Shoals about 1 mile long.
								estimat'd.	" "	
Central Hatchee.....	Near mouth.....	100.00	11.34	9.08	10.00	113.40	90.80	Low spring.	" "	Shoals about 1 mile long.
<b>JACKSON COUNTY.</b>										
Curry's Creek.....	Near Jefferson.....	8.00	0.91	0.72	18.00	16.42	13.13		Barrow.	

		91.39	10.42	8.33	26.00	270.87	216.69	Head is all shoal.	
Oconee River.....		Hurricane Shoals.....							
JASPER COUNTY.									
Ocmulgee River.....		Lloyd's Shoals.....	2166.00	246.00	196.80	39.62	9840.00	7872.00	
".....		Roach's Shoals.....	2166.00	246.00	196.80	7.50	1845.00	1476.00	
".....		Barnes' Shoals.....	1416.00	160.80	128.64	11.64	1851.50	1481.20	
".....		Seven Islands Shoals.....	2917.00	331.37	205.09	19.51	6620.00	5296.00	
JEFFERSON COUNTY.									
Limestone Creek.....		Tarver's Mill.....	20.00	2.28	1.82	7.00	15.96	12.76	Barrow.
Williamson Swamp.....		No. 11 C. R. R.....	100.00	11.36	9.12	10.00	113.60	91.	"
".....		Head's Mill.....	12.07	1.37	1.09	15.00	20.64	16.51	"
JOHNSON COUNTY.									
Deep Creek.....		Parson's Mill.....	18.00	2.05	1.64	10.00	20.50	16.40	Above low water.
Buckeye Creek.....		7 miles from mouth.....	30.00	3.42	2.73	10.00	34.20	27.30	Locke.
Prong of Ochopee.....		Winterville Road.....	5.00	0.57	0.45	10.00	5.70	4.50	"
JONES COUNTY.									
Ocmulgee River.....		Harris' Shoals.....	2917.00	331.37	265.09	2.30	761.30	609.00	Frobell.
".....		Johnston's Shoals.....	2917.00	331.37	265.09	5.10	1688.10	1350.50	"
".....		Holman's Shoals.....	2917.00	331.37	265.09	1.30	441.60	333.28	"
".....		Glover's Mill Shoals.....	2917.00	331.37	265.09	17.90	5958.00	4766.40	"
LINCOLN COUNTY.									
Little River.....		Dill's Mill.....	100.00	11.36	9.12	9.00	102.6	82.08	Barrow.
LUMPKIN COUNTY.									
Jones Creek.....		234, 5 and 1.....	5.00	0.57	0.45	50.00	28.50	22.80	"
Nimble Will.....		10 miles Dahlonega.....	50.00	5.70	4.56	12.00	68.40	54.72	"
owah River.....		5 " ".....	200.00	22.80	18.24	10.00	228.00	182.40	"

Fall exclusive of dam.

" " "

" " "

" " "

" " "

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one foot head.	Available horse-power of one-foot head.	Approximate head or an assumed head of 10 feet.	Theoretical power of stream with this head running 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
LUMPKIN Co.—Cont.										
Cane Creek.....	Near Dahlonga.....	40.00	56	3.64	10.00	45.60	36.40		Barrow.	Very large power, uses only 90 H. P.
Yahoola River.....	Mining Co.....	....	....	....	....	....	....		"	Estimated from wheel.
McDUFFIE COUNTY.										
Sweet Water Creek.....	Cotton Card Factory.....	....	....	....	21.00	36.00	....		"	
Little River.....	Beknap Smith.....	47.00	5.35	4.28	8.00	42.86	34.28		"	
MILLER COUNTY										
Spring Creek.....	Colquitt.....	66.56	7.52	6.01	10.00	75.20	60.10	Low water.	Locke.	Banks very flat.
MILTON COUNTY.										
Four Killer.....	Cr. Camp's Mill.....	28.00	2.68	2.12	20.00	53.60	42.40	Flush.	"	At low water about 10.0 cubic feet.
Big or Vickery's Creek.	Above Lebanon Mills.....	114.39	12.95	10.32	10.00	129.50	103.20	Low spring.	"	
Little River.....	Graham's Mill.....	119.00	13.51	10.80	10.00	135.10	108.00	" or more.	"	
MONROE COUNTY.										
Bushy Creek.....	4 miles Danielsville.....	5.00	0.57	0.45	10.00	5.70	4.50	Low spring or more.	"	
Ocmulgee River .....	Taylor's Shoal.....	2917.00	331.37	265.09	5.70	1886.70	1500.30	Low water.	Frobell.	Fall exclusive of dam.

Name of River or Power.	Location.	Area of Catchment in Acres.	Height of Fall in Feet.	Volume of Water in Cubic Feet per Second.	Volume of Water in Cubic Feet per Minute.	Volume of Water in Cubic Feet per Hour.	Volume of Water in Cubic Feet per Day.	Volume of Water in Cubic Feet per Week.	Volume of Water in Cubic Feet per Month.	Volume of Water in Cubic Feet per Year.	Remarks.
Ocmulgee River.....	Falling Creek Shoal.....	2917.00	331.37	265.09	1.71	562.70	450.16	Low water.			
" ".....	Dane's Shoal.....	2917.00	331.37	265.09	3.6	1191.60	913.28	"			
" ".....	Capp's Shoal.....	2917.00	331.37	265.09	5.60	1853.60	1482.88	"			
" ".....	Pitman's Shoal.....	2917.00	331.37	265.09	3.50	1158.50	936.80	"			
MURRAY COUNTY.											
Polecat Creek.....	214, 8, and 3.....	5.2	0.59	0.47	10.00	5.90	4.70	Barrow.			
Sugar ".....	298.....	15.3	1.74	1.39	10.00	17.40	13.90	"			
Mill ".....	299, 26, and 2.....	20.0	2.28	1.80	10.00	22.80	18.00	"			
Holly ".....	204, 26, and 2.....	20.0	2.28	1.80	10.00	22.80	18.00				
MUSCOGEE COUNTY.											
Bull Creek.....	Road to Woolfolk's.....	25.00	2.84	2.27	10.00	28.40	22.70	Above low water.			Very sandy.
Chattahoochee.....	Columbus.....	3000.00	340.80	272.64	106.0	36040.00	28832.00				Fall given by Capt. Bass. Cubic feet estimated.
NEWTON COUNTY.											
Yellow River.....	Georgia R.R. Bridge.....	666.	75.60	60.5	4.32	325.00	260.00	Frobell.			Fall of shoal exclusive of dam.
" ".....	Cedar Shoals.....	716.	81.30	65.00	62.66	5020.00	4056.00	"			"
" ".....	Indian Fishery Shoals.....	716.	81.30	65.00	12.27	996.00	796.80	"			"
" ".....	Allen's Shoals.....	716.	81.30	65.00	1.83	126.00	100.80	"			"
" ".....	Lee's Shoal.....	716.	81.30	65.00	3.97	324.00	259.20	"			"
" ".....	Dried Indian Shoal.....	716.	81.30	65.00	7.24	573.00	458.40	"			"
OGLETHORPE COUNTY.											
Long Creek.....	4 miles South Lexington.....	7.20	0.83	0.66	10.00	8.30	6.60	Barrow.			
PAULDING COUNTY.											
Tributary Pumpkinvine.	Stearn's Mill.....	6.00	0.68	0.54	12.0	8.16	6.52	Low spring.			Locke.
Lit.	16 miles Marietta.....	10.00	1.14	0.91	20.0	22.8	18.24	"			"
Raccoon Creek.....	Chappel's Store.....	22.0	2.51	2.00	12.0	30.00	24.0	"			Or flush.

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per sec- ond.	Theoretical horse- power of one-foot head.	Available horse- power of one-foot head.	Approximate head of 10 feet.	Theoretical power of stream with this head running 24 hours.	Available power of stream with this head working 24 hours of each day.	Condition of Stream.	By whom surveyed.	REMARKS.
<b>PAULDING Co.—Cont.</b>										
Peggy more.....	Lee's, near mouth.....	11.18	1.26	1.01	10.00	12.60	10.10	Low water.	Locke.	
Sweet Water.....	Seal's Bridge.....	12.00	1.36	1.08	10.00	13.60	10.80		"	
<b>PICKENS COUNTY.</b>										
Big Scared Corn.....	Fairmount Road.....	11.00	1.25	1.00	10.00	12.50	10.00		Barrow.	
Little ".....	" and Jasper Road.....	4.50	0.51	0.40	10.00	5.10	4.00		"	
Talking Rock Creek.....	Federal Road.....	13.33	1.52	1.21	10.00	15.30	12.10		"	
Love's Creek.....	".....	7.00	0.79	0.63	18.00	14.36	11.48		"	
Long Swamp.....	Below Forks.....	40.00	4.56	3.64	10.00	45.60	36.40		"	
Tribut'y of Long Swamp.....	Federal Road.....	6.00	0.68	0.54	10.00	6.80	5.40		"	
Stegall's Mill Creek.....	Stegall's Mill.....	10.00	1.14	0.91	10.00	11.40	9.10		"	
Long Swamp.....	Marble Quarry.....	23.00	2.62	2.09	10.00	26.20	20.96		"	
Fork Swamp.....	Jasper Road.....	8.11	0.92	0.73	12.00	11.08	8.86		"	
<b>POLK COUNTY.</b>										
Euharlee.....	Rockmart.....	25.00	2.85	2.28	10.0	28.50	22.80	Minimum low water.		
".....	2 miles North Rockmart.....	19.00	2.15	1.72	10.00	21.50	17.20	Low spring.		
".....	Hightower's Mill.....	5.40	.612	0.49	90.00	54.9	44.10	"		

Big Spring.....	Rome and Van Wert Road, 2 miles Van Wert.....	5.00	.57	.45	10.00	5.70	4.50	Low spring.	Barrow.
Little Cedar.....	Young's Mill.....	17.70	2.00	1.60	10.00	20.00	16.00	"	"
Big Spring.....	Cedar Town.....	9.60	1.08	.86	10.00	10.80	8.60	"	"
Gut Creek.....	At mouth.....	27.20	3.06	2.45	10.00	30.60	24.50	"	"
or more.									
QUITMAN COUNTY.									
Hoclarnee.....	Near mouth.....	6.00	0.68	0.54	10.00	6.80	5.44	Low water.	Locke.
Tobehannee.....	1 mile S. E. Georgetown.....	10.00	1.14	0.91	10.00	11.40	9.12	"	"
RABUN COUNTY.									
Head of Stekol.....	Near Clayton.....	3.75	0.43	0.34	30.00	12.90	10.32	Barrow.	
— Creek.....	Mouth.....	30.00	3.42	2.73	12.00	41.04	32.83	"	"
Wildcat Creek.....	".....	50.0	5.70	4.56	10.00	57.00	45.00	"	"
Tiger Creek.....	".....	40.60	4.63	3.70	15.00	69.45	55.56	"	"
RANDOLPH COUNTY.									
Roaring Branch.....	5 miles Fort Gaines.....	4.00	0.45	0.36	30.00	13.50	10.60	Low water.	Locke.
Wakefortsee Creek.....	Near Chemochochee.....	5.00	0.57	0.45	10.00	5.70	4.50	"	"
Very high heads at times.									
RICHMOND COUNTY.									
Augusta Canal.....	Augusta.....	....	....	....	....	12000 0	...	B. Holly,	Canal
Little Spirit Creek.....									
At mouth.....									
SCRIVEN COUNTY.									
Beaver Dam Creek.....	Jacksonborough.....	87.35	9.95	7.96	7.00	69.70	55.76	"	"
Briar Creek.....	Mill Haven.....	565.50	64.46	51.56	10.00	644.60	515.68	"	"
Rocky Creek.....	Wade's Mill.....	12.00	1.37	1.09	5.00	6.84	5.47	"	"

A PARTIAL LIST OF THE WATER-POWERS IN GEORGIA, ETC.—(continued.)

NAME OF STREAM.	POINT OF SECTION.	Cubic feet per second.	Theoretical horse-power of one-foot head.	Available horse-power of one-foot head.	Approximate head of stream with this head running 24 hours.	Available power of stream with this head running 24 hours.	Condition of Stream.	By whom surveyed.	REMARKS.
STEWART COUNTY.									
Wimberly's Branch....	Grimes & Freeman's Mill.....	8.80	1.00	0.80	12.00	12.00	Low water.	Locke.	Estimated.
Hodchodkee.....	Scott's Mill.....	12.00	1.35	1.08	10.00	13.50	" "	"	
TWIGGS COUNTY.									
Big Sandy..	Myrick's Mill.....	....	....	....	8.00	....	....	....	Too full to measure.
TROUP COUNTY.									
Shoal Creek.....	Troup Factory.....	81.00	9.23	7.38	18.00	166.14	Low water or more.	"	Estimated by wheels.
Muddy Creek.....	5½ miles LaGrange.....	7.00	0.79	0.63	10.00	7.90	" "	"	Estimated by wheels.
Blue John.....	2½ " ".....	3.00	0.34	0.27	10.00	3.40	" "	"	
Panther Creek.....	3¾ " ".....	25.00	2.84	2.27	10.00	28.40	" "	"	
Flat Creek.....	3¼ " Gorham's Mills...	20.00	2.28	1.82	12.00	27.36	" "	"	
Beach Creek.....	5 " LaGrange.....	35.00	4.00	3.20	15.00	60.00	" "	"	
Yellow Jacket.....	8½ " ".....	87.36	9.92	8.03	10.00	99.20	" "	"	
WALKER COUNTY.									
Fork of Dry Creek.....	¼ mile mouth.....	6.5	0.74	0.59	10.00	7.40	5.90	Narrow.	



## M I N E R A L   W A T E R S .

There is a great abundance of Chalybeate or Iron waters in the State in different geological formations. Limestone springs in the northwestern portion are numerous. Sulphur springs do not occur in great numbers.

The circumstances of the preparation of this outline do not allow more than an enumeration of those springs which have for years been resorted to for their medicinal properties.

Catoosa Springs, Catoosa Co.,	Madison Springs, Madison Co.,
Gordon Springs, Whitefield Co.,	Helicon Springs, Clarke Co.,
Cohutta Springs, Murray Co.,	Indian Springs, Butts Co.,
Rowland Springs, Bartow Co.,	Mineral Spring, Coweta Co.,
Dougherty's Spring, Polk Co.,	Newnan Spring, Coweta Co.,
Camp's Spring, Fulton Co.,	Sulphur Spring, Meriwether Co.,
Ponce de Leon Spring, Fulton Co.,	Warm Spring, Meriwether Co.,
Atlanta Mineral Spring, Fulton Co.,	Chalybeate Spring, Meriwether Co.,
New Holland Spring, Hall Co.,	Glenn's Spring, Early Co.,
Sulphur Spring, Hall Co.,	Springfield Spring, Effingham Co.,
Porter's Springs, Lumpkin Co.,	Heard's Spring, Wilkes Co.,
Franklin Springs, Franklin Co.	

*Analysis of Camp's Mineral Spring at West End, 2 $\frac{1}{4}$  miles  
from Union Depot, in Atlanta:*

	Grains.
Sulphuretted Hydrogen Gas.....	0.1720
Protocarbonate of Iron.....	2.0320
Sesquicarbonate of Iron.....	.3520
Protocarbonate of Manganese.....	.0050
Carbonate of Manganese.....	.0520
Carbonate of Lime.....	.3020
Chloride of Calcium.....	.1190
Chloride of Sodium.....	.1320
Silicate of Soda and Lime.....	.4300
Crenic and Apocrenic Acids.....	.0180
Free Carbonic Acid.....	1.0370
	<hr/> 4.8660

Total solid matter dried at 212° F. = 3.5324.

Analyzed by W. J. LAND, *Chemist.*

## MARLS.

Mr. Ruffin, in his "Essay on Calcareous Manures," has described the introduction in Virginia of the use of marl (so abundant in the southern half of Georgia), and has shown the great advantages to be derived from its use.

The experiments of Governor Hammond of South Carolina, with the marl from Shell Bluff, were described by him in a letter to the ——— Agricultural Society as eminently satisfactory.

Prof. Hilgard, in his Report on the Geology and Agriculture of Mississippi, has shown the very great importance of the marls of that State, which correspond closely with those in Georgia.

Prof. Cooke, in the New Jersey Report, devotes much attention to the green-sand marls of that State, as does Kerr in his Report on North Carolina geology.

Many years ago, Dr. Joseph Jones, in a Report to the Agricultural Society of Georgia, gave many analyses of our marls, and urged the free use of them by the planters.

It has been ascertained that there is scarcely a limit to the amount of this fertilizer so highly commended by these men, eminent in science and in agriculture. About 30 samples have been analyzed for the Geological Survey of Georgia, by Prof. H. C. White, of the State Agricultural College at Athens, and a report made on the properties of lime and marls. This report is herewith submitted for the information and guidance of such farmers as may have sufficient enterprise to make use of this means provided to their hands, for the regeneration and stimulation of their soils.

It is fortunate for the people of this State that limestone is so abundant in North-west Georgia as to be readily accessible everywhere and of excellent quality; while a belt of limestone crops out or appears on the surface, north of the Chattahoochee Ridge, in Hall and Habersham Counties, in North-east Georgia.

The map indicates the limits of the cretaceous and tertiary marls in the southern portion of the State.

I have seen in Effingham County, the effects last year of marl applied twenty years ago on Mrs. Longstreet's land, and could

distinguish by the fresh rich green color of the blades of corn, contrasting with the yellow, dry, and burnt leaves on adjacent land, the portion of the farm to which the shell marl had been applied, as pointed out by the gentleman who had spread it. Actual experience and practice have demonstrated, that with judicious rotation of crops, the application of lime not only permanently improves soil, but causes a uniformly increased production for as many as thirty years.

R E P O R T   O F   H . C . W H I T E ,

*Professor of Chemistry in the State College of Agriculture and the Mechanic Arts, upon the Agricultural uses and value of Marls and Peats, with Analyses of a number of samples obtained in Georgia:*

A T H E N S ,   G A . ,   J u n e   1 ,   1 8 7 6 .

D R .   G E O R G E   L I T T L E , *State Geologist, Atlanta, Ga. :*

D E A R   S I R : At your request, I have examined a number of specimens of marls and peats obtained during the progress of the Geological Survey, and have the honor herewith to present analyses of the same, with a few remarks concerning their character, and their economic value and importance to the State.

(A) MARLS.—Strictly speaking, the term “marl” should perhaps be only applied to such masses or deposits of earth as are calcareous in nature. In general use, however, it has come to have a much more extensive application, and to include within its meaning, earthy pulverulent masses of various sorts and compositions, many of which contain little or no lime. The necessity has therefore arisen for the classification of marl deposits, and for the qualification of the term by prefixed names, in the order of adjectives, generally suggested by and distinguishing some characteristic or peculiar property of the deposit. Thus, the “green-sand marls” of New Jersey are masses of loose, pulverulent earth, distinguished by the presence of numerous small particles of what appears to be *green sand*, the composition of which is chiefly silicate of iron and potash. Many of these “marls” contain very little lime. Clay marls contain much clay ; silicious or sandy marls much

sand. In either of these cases, the second prominent constituent should be carbonate of lime; sometimes, however, these names are applied to deposits which contain little or none of this last-named substance. "Shell marl" is a true marl, and has been formed by the disintegration and comminution of the larger shells from which it was derived.

It is but proper to say that the ultimate origin of *all* true calcareous marls was, perhaps, the shells or other secretions of marine animals. In "shell marl," these shells are comparatively very large, are generally discernible to the eye in some part of the mass, and consequently leave no doubt as to the origin in this case. Frequently, however, during the disintegration or breaking up of the shells, the finely divided portion has become mixed with clay, sand, and other matters, so that the material does not retain the composition of the pure shell. Very often, also, the disintegration of the shell is by no means complete, so that large fragments, and even entire shells, remain mixed with the mass.

The specimens of marls examined, and which represent perhaps the general character of much the larger part of the great marl deposits of Georgia, belong, with few exceptions, to the class of shell marls.

The peculiar properties and composition of marl render it a material capable of useful application in several industrial pursuits; but the one great industry in which it has, up to this time, mainly found application, and been esteemed valuable in the use, is agriculture. In treating of the uses and value of marl, therefore, we would naturally be led chiefly to consider its relations to fertility, and those of its properties which fit it for the use of the husbandman.

As an inspection will show, the analyses given herewith exhibit a great uniformity in the qualitative character of the specimens examined. The main differences indicated are in the relative *proportion* of the constituent substances. Of the substances named in the analyses, those which mainly give to the marls their agricultural value, are Lime, Magnesia, and Phosphoric Acid, to which may perhaps be added, as possessing some value, soluble Silica and organic matter.

(a) *Lime*.—The value of lime as a fertilizing agent, especially efficacious in the restoration of worn-out lands to a condition

of fertility, has been known for many years, and its use in this connection dates far back into antiquity. The main sources of the lime used in agriculture are, and have always been, limestones, marl, and marine shells not yet broken up and aggregated even to the condition of marl. Limestone differs from marl, in that the former is generally more or less compact and hard ; while the latter, even when exceedingly rich in lime, is generally pulverulent, crumbly, and soft. Limestone or shells are rarely ever used in their original, natural forms ; generally they are burned in kilns, which effect a radical change in their composition and properties.

As is well known, the lime in limestone (and in shells also) is combined with carbonic acid, forming carbonate of lime. On burning, the carbonic acid is driven away in the form of gas, and the lime is left behind. This "burnt lime" differs essentially from the carbonate of lime from which it was derived. The hard and compact limestone is changed to a loose, friable, and soft mass of lime. The mild, inactive limestone is transformed by the loss of its carbonic acid to "caustic" or "quick" lime, which must be handled with care lest it burn the flesh, and which exhibits a most powerful tendency to combine with water ; so strong is this attraction, that when quicklime is slaked by treatment with water, a great heat is developed by the energy of the combination, which manifests itself in the bubbling and steaming of the mass.

Moreover, caustic lime, if exposed, will attract to itself water from its surroundings, as the air (when it becomes "air-slaked" lime) or the soil upon which it may be applied. But water is not the only substance with which caustic lime exhibits a tendency to unite. It is what in chemical language is termed a strong *base*—*i.e.*, it has a great disposition to combine with acids ; and even though the acid be already united to other bases, it will frequently replace the latter by the superior strength of its attraction. The slaking of lime—either by the addition of water or exposure to air—while it diminishes its *causticity* and *quickness*, does not impair its basicity ; on the contrary, it may be said to increase it. Slaked lime therefore possesses the power of attracting to itself and uniting with acids.

It is usually in the caustic or slaked form that our agriculturists have been accustomed to apply lime to their soils in order to increase fertility. A knowledge of those properties discussed above may help us to understand something of its action in this connection. The action had by lime when applied to soils, as generally ascribed, may be briefly enumerated as follows :

1. Lime is a necessary article of food for all plants. Soils deficient in lime will, therefore, not produce good crops. Analysis shows, also, that it is one of the substances required in largest quantity by most plants for food. Continued cultivation would, therefore, exhaust a soil of its lime more quickly than of many other constituents.

2. Lime, by reason of its basicity, attacks and decomposes certain mineral salts in the soils, uniting with the acids and liberating the bases. Chief among the salts so decomposed are certain alkaline silicates—compounds of silicic acid with potash, etc.—which are, in themselves, not in a condition to be assimilated by plants, but which, when so decomposed, yield potash (especially) and other substances in an assimilable form, which are important articles of plant-food. The application of lime, therefore, to soils which contain such unavailable silicates (and nearly all soils do contain them in considerable quantity) is indirectly the application to the crop of available food from the soil, of which it otherwise would not have the advantage.

It may be noted that the soil would of itself, in course of time, present this food to the plant, since the disintegration and decomposition of the refractory silicates would in time be effected by weather and other natural agencies. The lime merely does in one season what the ordinary course of nature would require years to perform. It has, therefore, in some localities, come to be a proverb (based, it may be said, upon an experience which a proper forethought and a knowledge of the natural principles involved would have rendered less disastrous than it has many times unfortunately been) that “the use of lime enriches the fathers and impoverishes the sons”—meaning that the drain made upon the soil by the forcing of its stored-up plant-food into a condition at once ready to be taken up and appropriated by the growing crops, tends to exhaust the

land in a few years of all its power to produce and support vegetation ; and so it does.

If the application of lime alone, lavishly, indiscriminately, and without a knowledge and understanding of its action, its value, and danger, were all the farmer did to keep his land, then the truth of the proverb would be very soon attested.

We take it that the agriculturist is perfectly justifiable in seeking to obtain as large a yield for any given crop as his land will possibly afford. Indeed, it would seem that the true idea of agriculture should be to make the comparatively small portion of the soil that is concerned in plant-feeding do as much and as active service as possible. If all can be made available in one season, and the crop be proportionately increased, so much the better is it for the farmer ; and he is not only justified in his prosperity, but is worthy of commendation for cleverly and wisely taking advantage of the best service which nature and his land can render him. He is a thrifty, shrewd, and successful agriculturist who keeps his capital—*i.e.*, the plant-food of his soil—in active circulation.

Of a certainty—if this were all—the soil, thus deprived of its plant-feeding substance, would become worn out and barren ; but so it would, in course of time, if no forced production were had, and there were taken each season, only just so much as the soil, under its natural condition, was pleased to give. The difference is only one of time. In the latter case, the land, after yielding small—probably unremunerative—crops for several—10, 20, perhaps 30—years, would then fail to produce. In the former, abundant remunerative yields for two, three, or four seasons effect the same result.

Judged of from this consideration alone, it would appear that the more speedily the lands were rendered barren, the better. But it is well known that there is a remedy by which the barrenness incident to the continued gathering of small crops may be prevented, and that, by proper treatment, any given soil may be retained indefinitely in a condition of normal fertility. What is true of ordinary cropping applies with equal truth to extraordinary yields.

The Golden Rule of Agriculture, the prescriptive antidote to exhaustion, of universal application—whether the yield from the soil be great or small, whether it be normal or

abnormal, natural or forced, is this : Return to the soil each season as much plant-food as the previous crop carried away. The value of this rule is universally acknowledged, and its teaching followed in cases of ordinary production. It is equally applicable in cases of excessive yield induced by the use of lime. Where the yield is small, the matter returned to the soil need be but small ; where the yield is large, the return must be correspondingly great.

Nor need it be feared that the increased return made necessary, will tax heavily the profits of the large yield. A moment's consideration only is necessary to show that the valuable portion of the crop—that for which the crop was raised—whether the grain of the cereals or the lint of the cotton—constitutes, generally, but a small portion of the total vegetation produced. Only this portion—that which is desired for sale or consumption—should be removed from the soil. All else should be at once returned; and the drain upon the soil—small, even with large crops thus legitimately made—can certainly, in these days of Charleston Phosphates and German Potash Salts (not to mention numerous commercial fertilizers of various names and grades), be readily and cheaply compensated.

The farmer is therefore wise in stimulating production from his land by the use of lime, and his wisdom will lead him to retain unimpaired the productiveness of his land, by repaying the liberality of its increased yields by equally liberal applications of the elements of fertility. So, when properly studied and understood, it would appear that the observed facts which gave rise to the proverb quoted, are but testimony to the value of lime, when properly applied, as an agent in increasing the fertility of the soil.

3. Lime expedites and powerfully aids the decomposition of organic matter, of which all soils contain a greater or less proportion, probably through its great attraction for the carbonic and other acids formed during this process. In this respect, it is held by some that the action of lime is rather injurious than of advantage to the average soil. Whenever the organic matters are of a highly nitrogenous character, this is doubtless true ; whether it is so in other cases may perhaps be doubted. It is certain that lime renders a portion of the organic

matter soluble, and thereby improves its character ; the service thus rendered would, perhaps, at least counterbalance the ill effects of the destruction of a part of the organic matter.

4. By reason of its attraction for water, lime tends to abstract moisture from the soil to which it is applied. This action can, perhaps, hardly be put down to its credit, unless, indeed, in the case of soils containing an undue amount of water, the removal of which would go to their improvement. The evil, however, can in great part be corrected by the thorough slaking of the lime before application.

5. There are several minor actions of lime upon the soil which need not here be discussed at length. It is supposed, for instance, to increase the power of the soil to absorb ammonia from the atmosphere, though its value, perhaps, in this respect is but slight. Again, it sometimes happens that certain soils are barren because of the presence of certain substances, such as protosulphate of iron (copperas), which are poisons to plants. The application of lime will correct this poisonous character and restore fertility to the soil.

It would appear, from the foregoing discussion, that the claim of lime to rank high in value as an economical agricultural agent, is well sustained and must be considered beyond doubt.

It remains to be determined how far the marls, such as those, the analyses of which will be given in this paper, are capable of replacing the burnt lime of ordinary use, and to what extent their actions and values differ.

In marls, as in the original unburnt limestones, the lime is combined with carbonic acid, forming carbonate of lime. Marls, therefore, lack the basicity and causticity of burnt lime, and, so far as the value of the latter depends upon these properties, it can not be fully replaced by the former. Carbonic acid, however—although caustic and slaked lime have for it a great attraction—is an acid that can be driven from its combination with comparative ease. The carbonate of lime is, therefore, in some respects, not wholly without the properties of caustic lime. It possesses these, however, in a much less intense and active form. Thus the application of carbonate of lime to the soil would, in course of time, effect the disintegration and decomposition of unavailable silicates in

much the same manner as caustic lime would act in the same connection. The action would, however, be much slower, and would require a much greater length of time. The tendency on the part of marl, therefore, to exhaust the soil by stimulating increased production, would be much less rapidly exerted.

So far as the furnishing of lime as an article of food to plants is concerned, the marl is of equal value with the caustic lime. The lime is, perhaps, as available in one case as the other, or, at least, speedily becomes so. Marl has not the attraction for water that caustic lime possesses, and hence has no tendency to deprive the soil of its moisture. The available property possessed by slaked lime of improving the physical condition of the soil, by lightening it, rendering it porous and open to the effects of the air and rains, is shared to almost an equal extent by marl.

We may therefore conclude that it is perhaps doubtful if all the advantages to be derived from the use of caustic or burnt lime can be had by the use in its stead, of marl ; but that all the dangers which are incident to its application can be avoided, is certain.

It may be well to note the fact that burnt or slaked lime, on exposure or on application to land, does not long retain its caustic character, but, by absorbing carbonic acid from the air, it rapidly passes to the condition again of carbonate of lime. A consideration of this noteworthy fact has, indeed, led some to conclude that the increased value of burnt lime over limestone, was not due entirely to the causticity of the former, but, in considerable part, to the fact, that as a result of the burning, compact limestone was reduced to a loose, pulverulent, finely divided condition, better suited to act upon the soil. In other words, that the difference in action between limestone and burnt lime applied to the soil, is more *physical* than *chemical*.

It has accordingly been suggested that limestone finely powdered by mechanical means would possess much of the value of burnt lime.

Experiments made in accordance with this suggestion have, we believe, been attended with good results. The value which theoretical considerations of its composition and properties have assigned to marl as a fertilizing agent, is well attested

by the results of practical experiments. Wherever it has been employed, the increased fertility of the land has been well marked, and excellent results have been obtained.

The use of marl is not of recent introduction. Its value has been for many years recognized and turned to good account. Shell-marl especially is perhaps at this time more generally used, and in larger quantities, for agricultural purposes in England and Europe, than any other one article employed for fertilization. The causticity of burnt lime and its tendency to disorganize matter render caution in its use necessary, since a great excess might even attack and "burn up" the growing crop. With marl, mild and harmless, no such danger need be apprehended, if judiciously applied.

The amount used in practice varies very much. In different localities, from 10 to as much as 200 or 300 bushels per acre have been applied with profit, and on soils abundantly supplied with vegetable matter; but the quantity depends upon the condition of the soil and the quality of the marl. The character of the soil and various economical considerations must guide the farmer in his estimate of the amount he may with propriety employ.

In this State, marl has not yet come into general use; it has found local application only, but always with good results. We are not at this time in possession of statistics to the extent to which it is dug and used. No doubt when the true value of the great marl-beds within the borders of the State are properly understood, they will be more generously estimated as sources of agricultural wealth.

(b) *Magnesia*.—The action of Magnesia in the soil is very similar to that of lime. It possesses much of the value, but when present in large excess, has more than all the danger of common lime. When such excess is present, its effect is more injurious than valuable. We need not now detail the reasons for this action; hence certain magnesian limestones produce burnt lime which is not suitable for agricultural purposes. The amount found in the marls examined is so small that it adds somewhat to, while it detracts nothing from, their value as fertilizers.

(c) *Phosphoric Acid*.—This is the article of plant-food which, perhaps above all others, should claim the farmer's

most careful attention. It is absolutely necessary to the life and growth of plants; it is appropriated by them in large quantities, and is unfortunately furnished by the average soil in very small proportion. The soil is therefore very speedily exhausted of its supply, and it behooves the farmer to carefully and continually return phosphoric acid to his soil, lest it become barren through dearth of this ingredient. Phosphoric acid, in one form or another, is therefore made the basis of all good commercial fertilizers.

Marls generally contain a small proportion of phosphoric acid, and their value is much enhanced thereby; so much so, indeed, that the comparative value of two marls may be said to be in direct ratio to their proportion of phosphoric acid. The importance of the matter is such that the estimation of the phosphoric acid alone in the various marls of Georgia, is a work that would be well worthy the attention of the State.

(d) *Soluble Silica* and *Organic Matter* add something, perhaps, to the value of marls, when present. In the specimens examined, the quantities of both are so small that they perhaps influence their action to a very slight degree only.

We present the analyses of the samples of marls examined:

No. 1. From Washington County, two miles north of No. 13, Central Railroad: of nearly pure white appearance, coarsely granular, friable, and dry.

Lime .....	49.872	Oxide of Iron.....	1.654
Magnesia.....	0.120	Alumina.....	0.406
Carbonic Acid.....	39.215	Organic Matter.....	a trace
Phosphoric Acid.....	0.782	Water.....	1.628
Silica (soluble).....	0.984		
Sand .....	5.320	Total.....	99.981

No. 2. From Sapp's Mill, Big Spring, Burke County: of light yellowish brown color, containing clay; sandy texture, friable, and pulverulent.

Lime... ..	47.231	Oxide of Iron.....	2.140
Magnesia.....	0.082	Alumina.....	1.450
Carbonic Acid.....	36.979	Organic Matter.....	a trace
Phosphoric Acid.....	0.251	Water.....	1.784
Silica (soluble).....	0.128		
Sand.....	9.680	Total.....	99.725

No. 3. From Effingham County, Mrs. Longstreet's: a mass of coarsely comminuted shells mixed with sand, pebbles, etc.; fragmental, and of dark brown color.

Lime.....	15.948	Oxide of Iron.....	2.380
Magnesia.....	a trace	Alumina.....	1.354
Carbonic Acid.....	12.452	Organic Matter.....	0.256
Phosphoric Acid.....	0.075	Water.....	1.168
Silica (soluble).....	0.612		
Sand.....	65.620	Total.....	99.865

No. 4. From Crockett's Spring, Scriven County: pure white; rather compact; of very fine granular structure; crushing readily to impalpable powder.

Lime.....	50.136	Oxide of Iron.....	1.241
Magnesia.....	0.025	Alumina.....	0.215
Carbonic Acid.....	39.451	Organic Matter.....	0.124
Phosphoric Acid.....	0.045	Water.....	1.026
Silica (soluble).....	1.106		
Sand.....	6.628	Total.....	99.997

No. 5. From Reddick Quarry, Scriven County: nearly pure white; coarsely granular and friable, showing fragments and impressions of shell; very dry.

Lime.....	50.136	Oxide of Iron.....	3.218
Magnesia.....	0.054	Alumina.....	0.549
Carbonic Acid.....	37.054	Organic Matter.....	0.658
Phosphoric Acid.....	0.132	Water.....	1.231
Silica (soluble).....	1.582		
Sand.....	7.321	Total.....	100.120

No. 6. From Burke County, Shell Bluff: of faint brownish tinge; otherwise similar to preceding.

Lime.....	46.763	Oxide of Iron.....	4.310
Magnesia.....	0.046	Alumina.....	0.621
Carbonic Acid.....	36.521	Organic Matter.....	0.752
Phosphoric Acid.....	0.125	Water.....	1.314
Silica (soluble).....	1.216		
Sand.....	8.412	Total.....	100.080

No. 7. From Clay County Narrows, Pataula Creek: dark, bluish gray color; hence sometimes called "Blue Marl;" a friable mass of shells and calcareous fragments, mixed with fine, dark-colored earth; micaceous, the small particles of mica giving it a glistening appearance; slightly acid in reac-

tion, hence dangerous to use alone; should be mixed with small amount of caustic lime or purer marl before application.

Lime.....	4.891	Alumina.....	2.142
Magnesia.....	0.158	Potash and Soda.....	0.146
Carbonic Acid.....	3.740	Organic Matter.....	7.312
Phosphoric Acid.....	0.315	Water.....	2.450
Sulphuric Acid.....	0.543		
Silica (soluble).....	2.213	Total.....	100.130
Sand.....	71.112	Nitrogen (yielded by Or-	
Oxide of Iron.....	5.103	ganic Matter).....	0.058

No. 8. Clay County, above Brown's Mill, north of Fort Gaines: coarsely broken shells mixed with earthy and organic matter of a dark color; fragmentary and friable.

Lime.....	19.002	Alumina.....	1.106
Magnesia.....	0.025	Organic Matter.....	2.563
Carbonic Acid.....	15.040	Water.....	1.572
Phosphoric Acid.....	0.021		
Silica (soluble).....	0.823	Total.....	99.884
Sand.....	57.320	Nitrogen (in Organic Mat-	
Oxide of Iron.....	2.412	ter).....	0.013

No. 9. From Clay County, Fort Gaines, Chattahoochee River: light yellowish tinge (nearly white), coarsely granular and friable; forms and impressions of small shells and fragments distinctly visible.

Lime.....	44.942	Oxide of Iron.....	3.186
Magnesia.....	a trace	Alumina.....	2.450
Carbonic Acid.....	35.216	Organic Matter.....	1.306
Phosphoric Acid.....	0.019	Water.....	1.328
Silica (soluble).....	1.016		
Sand.....	10.462	Total.....	99.925

No. 10. From Chattahoochee County, Bagby's Mill: in general appearance and properties very similar to No. 7.

Lime.....	5.551	Alumina.....	2.321
Magnesia.....	0.162	Potash and Soda.....	0.158
Carbonic Acid.....	4.362	Organic Matter.....	8.121
Phosphoric Acid.....	0.231	Water.....	2.560
Sulphuric Acid.....	0.430		
Silica (soluble).....	0.312	T o t.....	100.109
Sand.....	70.919	Nitrogen.....	0.037
Oxide of Iron.....	4.932		

No. 11. A fossiliferous joint clay from Smith's Summit R. R. cut, ten miles north-east of Macon, Jones County: a clay containing fragments of shells.

Lime.....	10.128	Alumina.....	14.321
Carbonic Acid.....	7.264	Organic Matter.....	0.131
Phosphoric Acid.....	a trace	Water.....	5.616
Silica (soluble).....	2.320		
Sand.....	57.021	Total.....	100.085
Oxide of Iron.....	3.284		

No. 12. From Quitman County, near Hatchy's Station: a blue marl of light bluish gray color, coarsely granular and friable; contains sand and pebbles; slightly acid reaction.

Lime.....	7.740	Alumina.....	1.541
Magnesia.....	a trace	Potash and Soda.....	0.108
Carbonic Acid.....	6.081	Organic Matter.....	5.352
Phosphoric Acid.....	0.121	Water.....	2.421
Sulphuric Acid.....	0.812		
Silica (soluble).....	0.123	Total.....	100.090
Sand.....	72.191		
Oxide of Iron.....	4.106	Nitrogen.....	0.020

No. 13. From plantation of J. S. Odom, Montezuma, Macon County, Ga.: a light-colored, friable, coarsely granular shell marl.

Lime.....	43.672	Oxide of Iron.....	3.025
Magnesia.....	0.035	Alumina.....	1.756
Carbonic Acid.....	34.122	Organic Matter.....	2.105
Phosphoric Acid.....	0.028	Water.....	1.450
Silica (soluble).....	1.215		
Sand.....	12.642	Total.....	99.952

No. 14. From same locality as No. 13: a light yellow, loose, pulverulent marl.

Lime.....	46.212	Oxide of Iron.....	2.420
Magnesia.....	0.108	Alumina.....	2.586
Carbonic Acid.....	34.731	Organic Matter.....	0.291
Phosphoric Acid.....	0.875	Water.....	2.105
Silica (soluble).....	0.140		
Sand.....	10.532	Total.....	100.000

Nos. 15, 16 and 17. Three samples of light, buff-colored shell marls from Houston County.

	15.	16.	17.
Lime.....	45.384	46.732	45.654
Magnesia.....	0.213	0.098	0.075
Carbonic Acid.....	34.986	35.431	34.874
Phosphoric Acid.....	0.758	0.894	1.012
Silica (soluble).....	0.354	0.218	0.314
Sand.....	13.451	11.963	13.551
Oxide of Iron.....	2.105	2.346	2.082
Alumina.....	1.354	0.987	1.114
Organic Matter.....	0.075	0.113	0.130
Water.....	1.320	1.218	1.194
	<hr/> 100.000	<hr/> 100.000	<hr/> 100.000

No. 18. From the neighborhood of Albany, Dougherty County: dark-colored, loose, and pulverulent; contains an unusual amount of phosphoric acid, no doubt associated with a local deposit—perhaps recent—of animal bones.

Lime.....	42.876	Oxide of Iron.....	2.654
Magnesia.....	0.145	Alumina.....	1.328
Carbonic Acid.....	31.958	Organic Matter.....	2.394
Phosphoric Acid.....	2.574	Water.....	1.628
Silica (soluble).....	0.435		
Sand.....	14.008	Total.....	<hr/> 100.000

While a perfect acquaintance with the character and true agricultural value of the vast marl deposits found within the borders of the State, is to be had only after careful and extended examination (involving searching and critical analyses), the above stated results and remarks will perhaps serve to clearly indicate that such examination is well worthy the attention of the State, and that the labor thus bestowed, it might confidently be expected, would be productive of interesting and valuable results.

(B) PEATS.—Peat is an accumulation of organic with a varying proportion of earthy matter, that is found in swamps and marshes, or in localities where the land was at one time of a marshy character. Its production is the result of the partial decomposition and decay of leaves, twigs, and other vegetable bodies. To it are closely allied, in character and composition, such substances as muck, bog-earth, swamp-mud, etc. In peat, the decay of the organic matter has stopped

short of total decomposition. It is therefore largely carbonaceous, and is consequently generally of a black or dark brown color. Peat has hitherto found, in general, but two useful applications—viz., as fuel and as a fertilizer.

The specimens thus far found in this State, of which analyses are to be herein given, possess very little value as fuel, because of the small proportion of organic matter ; their fertilizing properties are, however, probably of considerable importance. As the analyses indicate, they contain a considerable proportion of mineral matter such as is valuable to plants for food. There can, perhaps, be no question that the association of this mineral matter with the organic matter of the peat, improves its condition to a considerable degree, and renders it more assimilable to plants than it otherwise would be. In order to estimate the extent of this improvement, it will be observed that experiments have been made (the results of which are hereafter recorded) to determine the solubility of the specimens and their constituents in a dilute solution of ammonium carbonate, which may be taken to represent the natural solvent of the soil through the agency of which plants receive their food. These experiments were, in fact, the application of the Grandean process of soil analysis to the samples of peat examined.

Peat is rarely, perhaps never, used alone in its application to land. It is generally composted with other substances, which greatly improve its character. The best substances for composting with peat are caustic lime, or lime that has been slaked by a strong solution of common salt in water. We have no doubt that many of our ordinary marls could be substituted for lime with good effects. Peat in its natural condition contains more or less nitrogen—a valuable fertilizing element—which it yields to the soil. Composting with burnt lime causes the escape and loss of this element. It is probable the use of marl would not be attended with this disadvantage. There are doubtless a great number of deposits of peat, muck, etc., in the State, many of which would be found very useful for agricultural purposes. Opportunity has not yet been presented, however, for a full and careful examination of these, so as to present at this time, a complete report upon their character and value. This will no doubt form a part of

the valuable and interesting work the Geological Survey has yet to perform.

We present the analyses of the samples examined :

No. 1. From Muscogee County, eight miles north-east of Columbus ; found at a depth of three feet below the surface ; of a light gray color ; heavy, dry, and friable ; specific gravity, 1.963.

Water.....	6.115	Carbonic Acid.....	0.587
Organic Matter.....	16.314	Oxide of Iron.....	4.145
Lime.....	0.652	Alumina.....	3.420
Magnesia.....	0.134	Silica (soluble).....	2.592
Potash.....	0.055	Sand.....	63.359
Soda.....	0.020		
Phosphoric Acid.....	0.245		
Sulphuric Acid.....	0.218	Total.....	99.850

Treated with a dilute solution of ammonium carbonate, the following were extracted from the peat :

Organic Matter.....	6.223	Phosphoric Acid.....	0.136
Lime.....	0.247	Silica, Iron Oxide, etc.....	5.274
Magnesia.....	0.091		
Alkalies.....	0.042	Total.....	12.013

No. 2. From same locality ; on the surface, in bed or layer 18 inches deep ; of dark gray color ; rather compact, but friable ; specific gravity, 1.195.

Water.....	7.340	Carbonic Acid.....	0.432
Organic Matter.....	21.531	Oxide of Iron.....	3.847
Lime.....	0.923	Alumina.....	1.642
Magnesia.....	0.152	Silica (soluble).....	7.431
Potash.....	0.086	Sand.....	46.883
Soda.....	0.018		
Phosphoric Acid.....	0.218	Total.....	100.120
Sulphuric Acid.....	0.117		

Treatment with ammonium carbonate extracted the following :

Organic Matter.....	7.658	Phosphoric Acid.....	0.125
Lime.....	0.352	Silica, etc.....	10.132
Magnesia.....	0.065		
Alkalies.....	0.054	Total.....	18.886

No. 3. From same locality: found on the surface in bed 18 inches deep; of black color; spongy and compact; specific gravity, 1.537.

Water.....	8.512	Carbonic Acid.....	0.675
Organic Matter.....	30.808	Oxide of Iron.....	2.563
Lime.....	0.920	Alumina.....	0.874
Magnesia.....	0.111	Silica (soluble).....	3.216
Potash.....	0.105	Sand.....	51.475
Soda.....	0.017		
Phosphoric Acid.....	0.239	Total.....	99.729
Sulphuric Acid.....	0.214		

Treatment with ammonium carbonate extracts the following :

Organic Matter.....	12.563	Phosphoric Acid.....	0.141
Lime.....	0.415	Silica.....	6.452
Magnesia.....	0.027		
Alkalies.....	0.075	Total.....	19.673

No. 4. Dougherty County, vicinity of Albany: a black muck from a cypress swamp; spongy, light, and of black color.

Water.....	11.321	Carbonic Acid.....	0.914
Organic Matter.....	22.450	Oxide of Iron.....	3.224
Lime.....	1.312	Alumina.....	2.415
Magnesia.....	0.129	Silica (soluble).....	4.621
Potash and Soda.....	0.152	Sand.....	53.115
Phosphoric Acid.....	0.241		
Sulphuric Acid.....	0.106	Total.....	100.000

This specimen was not treated with ammonium carbonate.

Analysis of a specimen of "clay slate" from Col. Seaborn Jones's land, Rockmart, Polk County, of a red color; said to be used to some extent as a paint.

Water.....	14.973	Silica.....	43.325
Oxide of Iron.....	11.321		
Alumina.....	30.381	Total.....	100.000

Trusting that the above report will be found satisfactory to yourself, and of some interest to the people of the State at large, and wishing you every success for the very valuable work in which you are engaged, I am,

Very truly yours,  
H. C. WHITE.

## SOILS.

TYPICAL COUNTIES—*Illustrating the Geological formation of the various Counties of the State, with information as to the general adaptation of the soil of said Counties for the various products of the Temperate Zone.*

1. DADE COUNTY.—Trenton and subcarboniferous Limestones give *calcareous* soil. *give calcareo silicious*  
 Chazy and Quebec ~~and Devonian Shales give aluminous~~ soil.  
 Subcarboniferous Cherts and Millstone Grit give *silicious* soil.  
 Clinton Iron ore gives *ferruginous* soil.  
 Alluvial bottoms along Lookout Creek give *humus* soil.
2. BARTOW COUNTY.—~~Trenton and~~ Quebec Limestones give *calcareous* soils.  
~~Chazy and~~ Quebec Shales give *aluminous* soils.  
 Chillhowee Sandstones and Quebec Cherts give *silicious* soils.  
 Limonite Iron ores give *ferruginous* soils.  
 Alluvial bottoms of Etowah, etc., give *humus* soils.
3. FULTON COUNTY.—Quebec Steatites, Serpentine, and Asbestos give *magnesian and calcareous* soils.  
 Quebec Granites give *alkaline and aluminous* soils.  
 Quebec, Itacolumite, and micaceous Schists give *silicious* soils.  
 Cincinnati, hornblendic Gneisses, and Schists give *ferruginous* soils.  
 Alluvial bottoms of Chattahoochee give *humus* soils.
4. HABERSHAM COUNTY.—Quebec Limestones, Steatites, and Tremolites give *calcareous* soils.  
 Potsdam, Cincinnati, and Quebec Gneisses give *aluminous* soils.  
 Potsdam and Quebec Sandstones give *silicious* soils.  
 Cincinnati hornblendic Gneisses give *ferruginous* soils.  
 Alluvial bottoms of Souqnee and Chattahoochee give *humus* soils.
5. MUSCOGEE COUNTY.—Cretaceous marls give *calcareous* soils.  
 Cretaceous Quaternary clays give *aluminous* soils.  
 Cretaceous and Quaternary sands give *silicious* soils.  
 Hornblendic Gneisses and ferruginous Sandstones give *ferruginous* soils.  
 Alluvial bottoms of Chattahoochee give *humus* soils.
6. CHARLTON AND WARE COUNTIES.—Tertiary marls give *calcareous* soils.  
 Quaternary swamps give *aluminous* soils.  
 Later Tertiary sands give *silicious* soils.  
 Quaternary clays give *ferruginous* soils.  
 Recent swamps give *humus* soils.

IN FULTON COUNTY, the limestone is wanting, but we have a substitute in the magnesian minerals and rocks of Quebec age—viz., the serpentines, soapstones, and asbestos beds; and hence they give a soil similar to the *calcareous* of Dade and Bartow. Some of the Gneisses also contain lime in limited quantity.

The *aluminous* or clay soils are abundant from the decayed granite which covers so large an extent of the county, as well as from the hornblende Gneisses, and these soils also contain a large per cent of alkaline matter, both potash and soda, though the preponderance of the Feldspar and Kaolin entitle them to be designated as above.

The Itacolumite bordering the Chattahoochee furnishes the sandy beds and *silicious* soils.

The *ferruginous* or red soils originate in the hornblende of the Gneiss, which is largely represented around Atlanta. There is very little vegetable matter, except such as is yearly deposited by the trees now growing; and hence they require ammoniated manures—home-made stable-composts, and commercial.

TROUP COUNTY, Virgin Soil (104).—As an example of the red clay soils of Middle Georgia, this will serve for a good representative. Only 69 per cent is insoluble, so that nearly one third of the whole is in a condition to be utilized by plants for their growth. Of this 31 per cent, there is soluble silica nearly 6 per cent, and hence wheat, oats, etc., find abundant material for strengthening their stalks. The amount of potash is small, only .083, and heads would not be well filled unless they received their material from the organic matter, which is present in great abundance—nearly 7 per cent. Phosphoric acid is almost entirely wanting—only .012 per cent. The organic matter would supply both of these, however, for some years.

The proportion of iron and alumina is very large—8.5 per cent of one, and 8.9 of the other; so that any fertilizer applied to this soil would be absorbed and retained. By thorough culture, exposing a large amount of these to the air, and allowing them to absorb ammonia from it, or by the addition of ammoniated phosphates, this important plant-food would be prepared for the use of the plants as they need it.

The proportion of lime is very good—.596 per cent, ample for supplying what is needed by the plant as food, but not sufficient to exert much influence in decomposing and disintegrating the insoluble matter and releasing from it potash and phosphoric acid when needed.

TROUP COUNTY, Virgin Subsoil (105).—This subsoil contains twice as much potash and phosphoric acid, and 50 per cent more lime, than the soil, and the same proportion of soluble silica; so that deep ploughing and subsoiling would exert a very favorable influence on this land, especially as the amount of organic matter in the subsoil seems to be almost two thirds as great as in the soil.

With proper care and judicious treatment, this soil should produce well from the first, could be improved in character constantly, bids fair to last for many generations, and can be made indefinitely fruitful by the addition of stable-manure, ashes, poudrette, liquid manures, or commercial phosphates and potash salts, and by keeping up a supply of organic matter.

BURKE COUNTY, Virgin Soil (135).—The analysis of this soil shows a large excess of insoluble matter, less than 5 per cent being soluble or available for plant-food. Of this 5 per cent, there is found a remarkable absence of the two ingredients which are so essential to the formation of the fruit and seed—viz., potash and phosphoric acid, there being only (.016) sixteen thousandths of one per cent of the former, and (.018) eighteen thousandths of one per cent of the latter. To complete the sterility of this soil, there is only .089 per cent of lime.

The proportion of organic matter is tolerably good, being 3.185 per cent, or about  $\frac{1}{3}$  of the whole.

This would indicate that the soil might produce a fair crop for a short time until this organic matter was exhausted, and then would relapse into hopeless barrenness; especially as the analysis shows less than 1 per cent of alumina and iron, which are useful in absorbing ammonia from the air when they exist in moderate quantities. For an unpromising soil, this may be entered for the premium.

BURKE COUNTY, Virgin Subsoil (136).—This subsoil, according to the analysis, takes away the last hope of the owner of ever having a productive farm, for it is almost identically the

same as the soil to the depth of 15 inches, with the difference that it contains almost no organic matter, there being less than 1 per cent of organic matter and water together, and probably most of this is water. The inference from the analysis would be that this soil has been formed from the buhrstone, which is almost pure silica; or from a bed of drift sand which had been very thoroughly washed by glacial waters.

No soil from this formation having been analyzed, this has been taken as the nearest representative from the same geological formation—*i.e.*, of the poor sandy soils of the county.

There is, however, a large amount of land in this county overlying the limestone portion of the Eocene formation, which forms a striking contrast with the soil above given. The pine soils of this county are among the best in the State.

In CHARLTON COUNTY, the Satilla marls furnish almost the only *calcareous* matter for soils. The larger portion of the dry land consists of the sands of the pine woods, and hence silicious soils predominate. On some of the ridges, this sand gives place to, or is mingled with, a red or mottled clay which furnishes a good subsoil, sufficiently *aluminous* to be retentive of moisture and manures, and these lands can be highly improved by the addition of the *humus* which is everywhere accessible in the smaller ponds and marshes, and exists in almost limitless supply in the great swamp. For the decomposition of this *humus*, and rendering it immediately available for plants, there is ready at hand, in the marls on the Satilla, the very best material.

ANALYSES OF OKEFINOKEE SWAMP SOILS FROM HUNTER'S  
REPORT, BY DR. DANIEL LEE, OF THE STATE UNIVERSITY,  
AT ATHENS.

Nos. 1, 2, 3, and 4 are from the north-eastern and eastern part of the swamp; No. 5 near middle; Nos. 6, 7, and 8 interior, north of the centre.

	1.	2.	3.	4.	5.	6.	7.	8.
Silica.....	90.00	92.74	89.00	90.00	86.20	87.20	84.23	82.17
Alumina.....	5.60	2.11	4.25	2.63	2.48	2.74	2.33	5.34
Oxide of Iron.	2.30	1.88	3.44	5.04	4.47	5.30	8.00	7.36

*Analyses of Okefnokee Swamp Soils, etc.—continued.*

	1.	2.	3.	4.	5.	6.	7.	8.
Lime.....	.32	.27	.87	.45	1.21	.87	.67	1.68
Magnesia.....	.23	.21	.36	.08	.85	.63	.38	.23
Potash.....	.17	.12	1.11	.83	1.67	.10	1.15	1.45
Soda.....	.54	.36	.02	.16	.74	.41	1.09	.47
Sulphuric Acid	.47	.31	.25	.26	.67	.70	.38	.31
Lime.....	.28	.19	.21	.18	.38	.17	.56	.34
Ph'sph'ric Acid	.09	.32	.18	.30	.46	.19	.87	.42
Loss.....	.60	1.48	.31	.07	.17	.69	3.34	.23
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
{ Organic....	53.47	93.75	88.00	80.42	90.25	88.90	93.92	93.52 }
{ Inorganic..	46.53	6.25	12.00	19.58	9.75	11.10	6.08	6.48 }
{ Humic Acid.	35.83	39.14	31.18	43.18	40.67	37.41	33.18	37.15 }
{ Ins'l. Humus	64.17	60.86	68.82	66.88	59.33	62.59	66.82	62.85 }

BARTOW COUNTY, Soil (8).—This soil shows by analysis 35 per cent available for plant-food. Of this nearly one fifth is soluble silica, ensuring good stalks for corn and small grain that will not be beaten down or bent by any ordinary rain.

Potash is present almost to the amount of 1 per cent—viz., .947. Phosphoric acid is .391—a very unusual amount. These two principal elements indicate the soil to be very valuable.

Lime and Magnesia are found to make up over 1 per cent—ample for any plants.

Oxide of Iron and Alumina aggregate over 11 per cent, so that by deep culture an abundance of moisture will always be supplied to the plant.

Organic matter amounts to 10 per cent, so that no fertilizer would be needed for very many years.

This test has actually been made, and the analysis of similar soils—one in its virgin state, and another sample subjected to a century of constant cultivation—proves that there has been removed by crops one half of the soluble silica, two thirds of the potash, one fourth of the lime, one third of the phosphoric acid, and one third of the organic matter; and still there is left a fair supply of all the important ingredients of plants, and far more than in many soils considered good and rewarding the laborer for tilling them.

## LIST OF WOODY PLANTS OF GEORGIA.

NO.	NO. OF FAM'Y.	FAMILY.	BOTANICAL NAME. GENUS. SPECIES.	COMMON NAME.	COUNTY.
1	2	Magnoliaceæ.	Illicium Floridanum.	Anise Tree.	
2	2	"	Magnolia grandiflora.	Magnolia.	
3	2	"	" glauca.	Sweet Bay.	
4	"	"	" umbrellæ.	Cucumber tree	
5	"	"	" acuminata.		
6	"	"	" cordata.		
7	"	"	" Fraseri.		
8	"	"	" Macrophylla.		
9	"	"	Liriodendron tulipefera.	White Poplar.	Murray.
10	3	Anonaceæ.	Asimina triloba.	Papaw.	Murray.
11	3	"	" grandiflora.		
12	24	Tiliaceæ.	Tilia Americana.	American Lime.	
13	"	"	" pubescens.		
14	25	Camelliaceæ.	Gordonia lasianthus.	Loblolly Bay.	
15	"	"	" pubescens.		
16	"	"	Stuartia Virginica.		
17	"	"	" pentagyna.	[Toothache Tree.	
18	34	Rutaceæ.	Xanthoxylum Carolinianum.	Prickly Ash or	
19	"	"	Ptelea trifoliata.	Hop Tree.	
20	37	Anacardiaceæ.	Rhus typhina.		
21	37	"	" glabra.		
22	37	"	" copallina.	Sumach.	Murray.
23	37	"	" pumilla.		
24	37	"	" { venenata	Poison Elder.	
25	37	"	" { toxicodendron. }	Poison Oak.	
26	37	"	" Aromatica.		
27	33	Vitaceæ.	Vitis labrusca.	Fox Grape.	
28	38	"	" æstivatis.	Summer Grape.	
29	38	"	" cordifolia.	Frost Grape.	Murray.
30	38	"	" vulpina.	Muscadine or Bullace.	
31	38	"	Ampelopsis quinquefolia.	Virginia Creeper.	
32	39	Rhamnaceæ.	Birchmia volubilis.	Supple Jack.	
33	39	"	Rhamnus lanceolatus.	Buckthorn.	
34	"	"	Trangula Caroliniana.	Carolina Buckthorn.	
35	40	Celastraceæ.	Euonymus Americanus.	Strawberry Bush.	
36	40	"	" atropurpurea.		
37	41	Staphylaceæ.	Staphyla trifolia.	Bladder-nut.	
38	42	Sapindaceæ.	Sapindus marginatus.	Soapberry.	
39	42	"	Æsculus glabra.	Horse-chestnut.	
40	42	"	" pavia.	Buckeye.	Whitefield
41	42	Sapindaceæ.	Sapindus flora.		
42	42	"	Asculus pariflora.		
43	43	Aceraceæ.	Acer Pennsylvanicum.	Striped Maple.	
44	"	"	" spicatum.	Mountain Maple.	
45	"	"	" saccharinum.	Sugar Maple.	
46	"	"	" dasycarpum.	Silver Maple.	Murray.
47	"	"	" aubrum.	Red or Swamp Maple.	
48	"	"	Negund acroïdes.	Ash-leaved Maple.	Port Elder
49	47	Leguminosæ.	Amorpha herbacia.		
50	47	"	" canescens.		
51	47	"	Robinia pseudacacia.	Locust.	
52	47	"	" viscosa.		
53	47	"	" hispida.		

## LIST OF WOODY PLANTS OF GEORGIA.—(Continued.)

NO.	NO. OF FAM'Y.	FAMILY.	BOTANICAL NAME. GENUS. SPECIES.	COMMON NAME.	COUNTY.
54	47	Leguminosæ.	Wistaria frutescens.	<i>Wistaria</i>	
55	47	"	Erythrina herbacea.		
56	47	"	Cladrustia tinctoria.	Yellow Wood.	
57	47	"	Circis Canadensis.	Red Bud.	Murray.
58	47	"	Gleditsia triacanthos.		
59	47	"	" monosperma.		
60	48	Rosacæ.	Chrysobalanus oblongifolius.		
61	48	"	Prunus Americana.		
62	48	"	" umbellata.		
63	48	"	" serotina.	Wild Cherry.	Murray.
64	48	"	" Virginiana.		
65	48	"	" Carolinacana.	Mock Orange.	
66	48	"	Crataegus spathulata.	Hawthorn.	
67	48	"	" æstivalis.	Summer or Red Haw.	
68	48	"			
69	48	"	7 other species.		
70	48	"	Pyrus coronaria.		
71	48	"	" angustifolia.		
72	48	"	" anarbulifolia.		
73	48	"	" Americana.		
74	48	"	Amelanchier Canadensis.		
75	49	Calycanthaceæ.	Calycanthus Floridus.		
76	49	"	" lævigatus.		
77	49	"	" glaucus.		
78	52	Lythracæ.	Nesaea verticillata.		
79	57	Grossulacæ.	Ribes.		
80	64	Saxifragacæ.	Hydrangea arborescens.		
81	64	"	" radiata.		
82	64	"	" quercifolia.		
83	64	"	Decumaria Barbara.		
84	65	Hamamelacæ.	Philadelphus grandiflorus.	Syringa.	
85	65	"	Hamamelis Virginica.	Witch Hazel.	Murray.
86	65	"	Fothergilla alnifolia.		
87	65	"	Liquidambar styraciflua.	Sweet Gum.	Murray.
88	68	Cornacæ.	Cornus alterniflora.		
89	68	"	" stricta.		
90	68	"	" paniculata.		
91	68	"	" sericea.		
92	68	"	" asperifolia.		
93	68	"	" Florida.	Dogwood.	Whitefield
94	68	"	Nyssa multiflora.	Sour Gum.	Murray.
95	68	"	" agnatica.		
96	68	"	" uniflora.		
97	68	"	" capitata.	Ogeechee Lime.	
98	69	Capsifoliacæ.	Symphoricarpus vulgaris.	Snowberry.	
99	69	"	Sambucus Canadensis.	Elder.	
100	69	"	Viburnum prunifolium.		
101	69	"	" lentago.		
102	69	"	" obovatum.		
103	69	"	" acerifolium.		
104	69	"	" nudum.		
105	69	"	" dentatum.		
106	69	"	" scabellum.		
107	70	Rubiaceæ.	Cephalanthus occidentalis.	Button-bush.	

## LIST OF WOODY PLANTS OF GEORGIA.—(Continued.)

NO.	NO. OF FAM'Y.	FAMILY.	BOTANICAL NAME. GENUS. SPECIES.	COMMON NAME.	COUNTY.
108	70	Rubiaceæ.	Pinckneya pubens.	Georgia Bark.	
109	70	"	Gelsemium sempervirens.	Yellow Jessamine.	
110	76	Ericaceæ.	Gaylussacia frondosa.	Huckleberry.	
111	76	"	" dumosa.		
112	76	"	" resinosa.		
113	76	"	Vaccinium crassifolium.	Huckleb'ry, Blue-	
114	76	"	" stamineum.	[berry.	
115	76	"	" arboreum.		
116	76	"	" nitidum.		
117	76	"	" myrsinites.		
118	76	"	" tenellum.		
119	76	"	" Elliottii.		
120	76	"	" corymbosum.		
121	76	"	Leucothoe axillaris.		
122	76	"	" catesbei.		
123	76	"	" acuminata.		
124	76	"	" racemosa.		
125	76	"	Andromeda ferruginea.		
126	76	"	Oxydendrum arboreum.	SourWood or Sor-	
127	76	"	Clethra.	[rel Tree. Murray.	
128	76	"	Kalmia latifolia.	Calico Bush.	
129	76	"	" angustifolia.	Sheep Laurel.	Murray.
130	76	"	Rhododendron arborescens.	Roseboy Honey-	
131	76	"	" maximum.	[suckle.	
132	78	Aquifoliaceæ.	Ilex opaca.	Holly.	Murray.
133	78	"	" dahoon.		
134	78	"	" cassine.		
135	78	"	" ambigua.		
136	79	Styracaceæ.	Styrax pulverulentum.	Storax.	
137	79	"	" grandifolium.		
138	79	"	" Americanum.		
139	79	"	Halesia diptera.	Snowdrop Tree.	
140	79	"	" tetraptera.		
141	79	"	Symplocos tinctoria.		
142	80	Cyrillaceæ.	Cyrilla racemiflora.		
143	80	"	Cliftonia ligustrina.	Titl.	
144	80	"	Elliottia racemosa.		
145	81	Ebenaceæ.	Diospyros Virginiana.	Persimmon.	Murray.
146	82	Sapotaceæ.	Bumelia canuginosa.		
147	89	Bignoniaceæ.	Bignonia capreolata.	Crossvine.	Murray.
148	89	"	Tecoma radicans.	Trumpet Flower.	
149	89	"	Catalpa bignonioides.		
150	93	Verbenaceæ.	Lantana camara.		
151	93	"	Callicarpa Americana.	French Mulberry	Murray.
152	104	Oleaceæ.	Olea Americana.	Olive.	
153	104	"	Chionanthus Virginica.	Fringe Tree.	
154	104	"	Fraxinus Americana.	White Ash.	Murray.
155	104	"	" pubescens.	Red Ash.	
156	104	"	" viridis.	Green Ash.	
157	104	"	" platycarpa.	Water Ash.	
158	104	"	Forestiera ligustrina.		
159	111	Lauraceæ.	Persea Carolinensis.	Red Bay.	
160	111	"	Sassafras officinale.	Sassafras.	
161	111	"	Benzoin odoriferum.	Spice Bush.	

## LIST OF WOODY PLANTS OF GEORGIA.—(Continued.)

NO.	NO. OF FAM'Y.	FAMILY.	BOTANICAL NAME. GENUS. SPECIES.	COMMON NAME.	COUNTY.
162	111	Lauraceæ.	Tetranthera geniculata.	Leatherwood.	Murray.
163	112	Thymelæaceæ.	Dirca palustris.	Mulberry.	Murray.
164	124	Moraceæ.	Morus rubra.	Slippery Elm.	Murray.
165	125	Ulmaceæ.	Ulmus fulva.	Elm.	"
166	125	"	" Americana.	Wahoo.	"
167	125	"	" alata.	Planer Tree.	"
168	125	"	Planera aquatica.	Nettle Tree.	"
169	125	"	Celtis occidentalis.	Sycamore.	Whitefield.
170	126	Platanaceæ.	Platanus occidentalis.	Shell-bark Hick-	"
171	127	Juglandaceæ.	Carya alba.	Hickory. [ory.	"
172	"	"	" tomentosa.	Pig-nut.	"
173	"	"	" glabra.	Butternut.	"
174	"	"	" amara.	Black Walnut.	"
175	"	"	Juglans nigra.	Butternut.	"
176	"	"	" cinerea.	Willow Oak.	"
177	128	Cupulifereæ.	Quercus phellos.	High-ground Oak.	"
178	128	"	" cinerea.	Live Oak.	"
179	128	"	" virens.	Water Oak.	"
180	128	"	" aquatica.	Black Jack.	"
181	128	"	" nigra.	Turkey Oak.	"
182	128	"	" catesbaei.	Black Oak.	Whitefield.
183	128	"	" tinctoria.	Scarlet Oak.	"
184	128	"	" coccinea.	Red Oak.	Whitefield.
185	"	"	" rubra.	Stone Mt. Oak.	"
186	128	"	" Georgiana.	Spanish Oak.	"
187	128	"	" falcata.	Bear Oak.	"
188	128	"	" ilicifolia.	Post Oak.	Whitefield.
189	128	"	" obtusiloba.	White Oak.	"
190	128	"	" alba.	Overcup Oak.	"
191	128	"	" lyrata.	Swamp Chestnut.	"
192	128	"	" prinus.	Chestnut Oak.	"
193	128	"	" prinus.	Chinquapin Oak.	"
194	128	"	" prinoides.	Chestnut.	Whitefield.
195	"	"	" Castanea Americana.	Chinquapin.	"
196	"	"	Castanea pumila.	Beech.	Murray.
197	"	"	Fagus ferruginea.	Hazel-nut.	"
198	"	"	Coryllus Americana.	Beaked Hazel-nut.	"
199	"	"	" rostrata.	Hornbeam.	Whitefield.
200	"	"	Carpinus Americana.	Hop Hornbeam.	"
201	"	"	Ostrya Virginica.	Wax Myrtle.	"
202	129	Myricaceæ.	Myrica cerifera.	Black Birch.	"
203	129	"	" inodora.	Cherry Birch.	"
204	130	Betulaceæ.	Betula nigra.	Alder.	"
205	130	"	" lenta.	Sage Willow.	"
206	130	"	Alnus serrulata.	"	"
207	131	Salicaceæ.	Salix tristis.	"	"
208	131	"	" humilis.	"	"
209	131	"	" nigra.	"	Whitefield.
210	"	"	Populus angulata.	"	"
211	"	"	" grandidentata.	"	"
212	"	"	" heterophylla.	Cotton-wood.	"
213	132	Coniferae.	Pinus pungens.	Scrub Pine.	"
214	132	"	" inops.	Spruce Pine.	Murray.
215	132	"	" glabra.	"	"

LIST OF WOODY PLANTS OF GEORGIA.—(*Continued.*)

NO.	NO. OF FAM'Y.	FAMILY.	BOTANICAL NAME. GENUS. SPECIES.	COMMON NAME.	COUNTY.
216	132	Coniferae.	<i>Pinus mitis.</i>	Short-leaved Pine.	Murray.
217	132	"	" <i>rigida.</i>	Pitch Pine.	
218	132	"	" <i>serotina.</i>	Pond Pine.	
219	132	"	" <i>tæda.</i>	Loblolly Pine.	Whitefield.
220	132	"	" <i>australis.</i>	Long-leaved Pine.	
221	132	"	" <i>strobilus.</i>	White Pine.	Murray.
222	132	"	<i>Abies Canadensis.</i>	Hemlock Spruce.	
223	132	"	<i>Juniperus Virginiana.</i>	Red Cedar.	
224	132	"	<i>Cupressus thyoides.</i>	White Cedar	
225	132	"	<i>Taxodium distichum.</i>	Cypress.	
226		"	<i>Torreya taxifolia.</i>		
227	134	Palmacææ.	<i>Sabal palmetto.</i>		
228	134	"	" <i>serrulata.</i>		
229	134	"	<i>Chamaerops hystrix.</i>		
230	134	"	<i>Prunus spinosa.</i>	Bullace Plum.	Sloe.

EXTERNAL AND INTERNAL RELATIONS OF  
GEORGIA.

## SITUATION.

THE exact situation of Georgia (or any other State), either in the Union or on the earth's surface, is not often comprehended by readers. The bare statement of latitude and longitude makes but little impression, especially of the relative situation. The figures for Georgia, however, are as follows—viz.:

Between latitude  $30^{\circ} 21' 39''$  and  $35^{\circ}$  north, and longitude  $80^{\circ} 50' 9''$  and  $85^{\circ} 44''$  west of Greenwich—nearly one fourth of a full circumference west of England. The National Observatory in Washington City is  $77^{\circ} 02' 48''$  west of Greenwich, and the longitude of Georgia referred to Washington is between  $3^{\circ} 47' 21''$  and  $8^{\circ} 42'$  west. The difference in time between the eastern and western extremities of the State is not quite 20 minutes. The latitude and longitude of Atlanta, ascertained by the United States Coast Survey for the flagstaff on the Capitol, are, latitude  $33^{\circ} 45' 19.8''$ ; longitude,  $84^{\circ} 23' 29.7''$ .

The latitude and longitude of several well-known mountains in Georgia are as follows :

	LATITUDE.	LONGITUDE.
Stone Mountain.....	33° 48' 22.5"	84° 08' 46.3"
Kennesaw " .....	33° 58' 34.8"	84° 34' 46.4"
Sweat " .....	34° 04' 01.9"	84° 27' 22.2"
Sawnee " .....	34° 14' 12.7"	84° 09' 39.3"
Lost " .....	33° 56' 53.2"	84° 41' 51.5"
Carnes " .....	33° 59' 36.2"	85° 00' 50.9"
Pine " .....	34° 10' 37.1"	84° 44' 42.4"
Pine Log " .....	34° 19' 18.9"	84° 38' 14.4"
Lavender " .....	34° 19' 20.0"	85° 17' 19.4"
Blood " .....	34° 44' 24.1"	83° 56' 13.6"
Currahee " .....	34° 31' 45.9"	83° 22' 33.4"

Latitude is much more significant in its bearings than longitude, largely affecting climate and productions. Georgia lying between 30° and 35° north, the sun, at the summer solstice, lacks but 8° of being vertical on her southern border. The difference of latitude between the two borders—say 4½°—is greater than in most of the States, the greatest length being north and south ; and the corresponding difference of climate and productions is augmented by the fact that the most northern part of the State is also the most elevated. These circumstances taken together make a remarkable range of production.

The Southern States occupy the south-east corner of the United States, and Georgia is nearly in *their* south-east corner—Florida occupying it exactly.

#### COMMERCIAL SITUATION—BEST SITE ON THE CONTINENT.

Georgia, it will be observed, is the keystone of the arch formed by the grand curve of the Atlantic States on the one side, and the Gulf States on the other.

The best commercial site on the continent is undoubtedly in North America—not South. It must be found on the Atlantic—not on the Pacific, which is too remote. It must not be on the Gulf Coast, which has a difficult navigation, but on the Atlantic, fully open to the sea. The determining criterion is the trade of the Great Mississippi Valley. Every Atlantic State has ample facilities for its own immediate trade.

The decisive criterion of the best commercial site is the relative adaptation for the trade of the Great Valley. Georgia occupies this position. Geographically, she is on the shortest line ; topographically, on the most feasible ; climatically, on the line least obstructed by ice.

This fine position nature has assigned her by placing her below the great Appalachian chain, which more than a Chinese Wall separates the ocean from the Great Valley. This "backbone of the Continent" rising in Canada, terminates in Alabama and Georgia. Here for the first time the "endless"—the Indian meaning of Alleghany—finds an end and opens a gate for commerce on the shortest line from the heart of the Valley.

Take the Mississippi Valley as the centre of the Continent, and the junction of the Mississippi and Missouri Rivers at St. Louis as the heart of the Valley : from this centre the nearest Atlantic coast is the sea-coast of Georgia. With one end of the compasses at the junction, the arc with the least radius will touch the Georgia coast. Or take Cairo, at the mouth of the Ohio River, and the case is still more marked. Even from Louisville the observation is still true ; while from Cincinnati the length of the line is nearly the same, and really, in view of the intervening obstacles, the shortest practicable line. The critical position of Georgia becomes more and more manifest by careful study of the map. Of the three great slopes, the Atlantic, the Gulf, and the Valley slope, Georgia is the only State of the Union which impinges upon each. The head-waters of the Savannah, the Chattahoochee, and the Tennessee flow from a point within her borders.

Nearly all the rivers of all the other Atlantic States flow in parallel directions south-east into the ocean. Georgia rivers from the central point first referred to, flow as radii south-east, south, and south-west (and, as if nature were not content to do things by halves, the Tennessee River, emptying into the Mississippi, bends, with an elbow almost projecting into Georgia, accommodating itself to the natural opening).

The immense importance of the Valley trade has been long and fully appreciated. In every part of the course of the long mountain chain, every weak point has been carefully examined as a passway for the trade. Beginning in New York and

coming south through Pennsylvania, Maryland, Virginia, and North Carolina to South Carolina and Georgia, every opening has been criticised and essayed. The success of De Witt Clinton, in opening this navigation at heavy expense, laid the foundation of the commercial prosperity of New York, which sprung immediately ahead of Philadelphia and other rivals.

General Washington made strenuous and protracted efforts to make the Potomac the connecting link, and was himself the president of a company incorporated for that purpose.

In North Carolina, Judge Murphy made similar efforts. Indeed, there is a long history to it all—various States knocking at the door for passage through the mountain-chain. It was thoroughly understood and appreciated by Mr. Calhoun, of South Carolina, in its relations to railroad communication, the only method applicable to that State. But the natural and easiest vent of the commerce of the Mississippi Valley is on the coast of Georgia.

By observing the course of the Missouri River in a southeasterly direction to its junction with the Mississippi, and following the same direction to the ocean, it would terminate on the Georgia coast ; and the water communication *via* the Mississippi, Ohio, and Tennessee, and then by canal and the rivers of Georgia to the coast, would require no greater variation of direction than actually occurs in the course of the Missouri or other great rivers. A line from the head-waters of the Missouri to St. Louis continued, would strike the coast of Georgia ; and the water communication above indicated would have the same general direction.

The magnificent natural position of Georgia was understood by Governor Troup, who recommended practical measures for taking advantage of it. Those who have regarded Governor Troup rather as a man of vigor and will than a man of thought, will find in his messages and speeches the traces of a deliberate and well-balanced judgment. The invention of railroads, as a new means of transportation, diverted attention from the canal system, which was just to be practically inaugurated under his administration with his warm support. It was supposed that these would more thoroughly displace canals than has proved true in fact.

In his annual message of 1824, Governor Troup said :

“The period has arrived when Georgia can no longer postpone the great work of internal improvement. If considerations of the highest order could not prevail, State pride should be a motive sufficiently strong to determine her. Some of her sisters are already far in advance of her. Almost all of them have to a greater or less extent embarked in it. She sees the most enterprising and persevering among them, already deriving advantage from it, which places them in the first rank of opulence and power. A State, therefore, like Georgia, blessed by Providence with the means of reaching the highest commercial prosperity by a road plain, direct, and practicable, will no longer linger in the rear. She will begin, and, with a little patience and perseverance, instead of decaying cities and a vacillating trade, and, what is most humiliating, that trade seeking an emporium elsewhere than within her own limits, she will witness the proud and animated spectacle of maritime towns restored and flourishing, new ones rising up—her trade steady and increasing—her lands augmented in value and improved in cultivation—the face of the country beautified and adorned ; and she may witness—what was once deemed impossible to human efforts—the western waters mingling with her own, and the trade of Missouri and Mississippi floated through her own territory to her own seaports; and all this within the compass of her own resources, provided the ordinary economy, prudence, and foresight be employed to husband, cherish, and improve them.”

The making of a great canal through Georgia, connecting the western and eastern waters, has been actively canvassed of late years, and its feasibility is endorsed by the highest engineering authority. The scheme has been warmly and ably supported by Col. B. W. Frobels, who has thoroughly studied all its details. So great is the interest of the entire West and North-west in such a work, that it can not be permanently neglected.

If there were a proposition made to close the mouth of the Mississippi to the commerce of the Great Valley, how would it be received ? Practically, for commercial purposes, a new mouth can be opened and made available to this great trade. The route has been surveyed by order of Congress—the survey

demonstrating that the project is undoubtedly practicable ; and the line was adopted by the Senate Committee on Transportation as one of the great water-lines of the country.

The work has been practically commenced in improving the rivers, under appropriations by Congress, which are to form parts of this great artery of traffic.

As this is the shortest line of water communication, so also for rail. This first easy gap between the valley and ocean is penetrated by the Georgia State Road, or Western and Atlantic Railroad, from Chattanooga to Atlanta—a single connecting link fed by several roads from the North, and feeding several toward the South.

A second opening passes through the Rabun Gap in the north-eastern corner of the State, and the valley of the Hiwassee River, of which South Carolina was availing herself before the late war.

Georgia is thus the direct and almost necessary channel from the heart of the continent to the sea—the great highway of commerce.

The importance of the commercial situation of Georgia is further shown as the eastern terminus of a Great Pacific Railroad. No other portion of the sea-coast is so favorably situated as hers. The road passing substantially along the 32d parallel of latitude, by its western terminus near San Diego and its eastern in Georgia, is the route indicated by nature as best subserving travel and transportation, free from winter obstructions and the numerous impediments of circuitry and natural obstacles.

Of the Cotton-Belt—Cotton being the leading article of export—Georgia furnishes the proper Atlantic outlet.

Such are some of the advantages peculiar to her commercial situation.

#### TRANSPORTATION LINES IN THE STATE.

She has her full share of other advantages common to her with other States. In the Shore line of Railroads, she forms one link ; so also in the Piedmont line of roads connecting the Atlantic and Gulf States. She has three or four separate links passing through the State from west to east—viz. : the line from Eufaula by way of Macon and Millen to

Augusta ; another from Columbus *via* Macon to Savannah ; a line from West Point *via* Atlanta to Augusta ; and one from Atlanta to Charlotte, N. C. She avails herself also of the mountain valley route by means of the Selma, Rome, and Dalton Road, and the East Tennessee and Georgia Road.

Upon an impartial comparison of natural advantages, the position of Georgia, her external relations to commerce, and her facilities for intercourse, trade, and travel, are unsurpassed. To their complete development, a less expenditure of funds, public or private, than has been required for other developments incapable of the same completeness, would suffice. By nature, neither the Erie Canal nor the Chesapeake and Ohio, neither the Pennsylvania Railroad, the Baltimore and Ohio, nor the Chesapeake and Ohio, possesses such admirable advantages ; yet these artificial channels, prepared at enormous expense, have given the advantages of prepossession to other States and sections. The natural advantages may yet assert themselves, when the whole country is filled with population and capital, and when competition for trade becomes close and keen.

Resting upon the Atlantic, Gulf, and Mississippi slopes, Georgia, were her resources properly developed, occupies the mouth of the great funnel through which might pour the wealth of the continent—herself capable, by the finest combination of natural gifts, of a most perfect and systematical internal development.

So much for the external relations of Georgia as to geographical and topographical situation.

#### BOUNDARIES.

The boundaries of the State form the subject of a voluminous correspondence in the State archives. The following are the outlines, given as by notes of a surveyor :

1. Beginning at the mouth of the Savannah River ; along the river to the junction of the Kiowee, and along the Tugaloo to the junction of the Tallulah and Chattooga ; thence along the Chattooga to a point on the 35th parallel of north latitude, at the union of the northern boundary of South Carolina and the southern boundary of North Carolina. The

general course is about north  $35^{\circ}$  west, and the length, in a direct line, about 247 miles. It terminates at Ellicott's Rock, on the Chattooga River, marked,

**"Lat.  $35^{\circ}$ , A.D. 1813, N.C., S.C."**

This line, in conformity with the Treaty of Beaufort, separates Georgia from South Carolina (all the islands of the rivers Savannah, Tugaloo, and Chattooga being reserved to Georgia).

2. Thence on the 35th parallel of north latitude, due west to Nickajack on the northern boundary of Alabama. This line separates Georgia from North Carolina for  $78\frac{3}{4}$  miles to the junction of North Carolina and Tennessee; and thence for  $73\frac{1}{4}$  miles separates Georgia from Tennessee.

3. From Nickajack, the line between Georgia and Alabama runs south  $9^{\circ} 30'$  east, to Miller's Bend on the Chattahoochee River, about 146 miles.

4. Thence down the western bank of the river at high-water mark to its junction with Flint River, at a point now four chains below the actual junction—latitude  $30^{\circ} 42' 42''$ ; longitude,  $80^{\circ} 53' 15''$ . The average direction of this line is about south  $6^{\circ}$  east, and distance about 150 miles direct. About 130 miles, it separates Georgia from Alabama, and the remaining 20 miles from Florida.

5. Thence along Orr and Whitner's line, south  $87^{\circ} 17' 22''$  east (average direction),  $158\frac{2}{3}$  miles, to a point 37 links north of Ellicott's Mound, on St. Mary's River. This line is marked by a succession of mounds about 10 feet at the base and 5 feet high—a very permanent form of landmark—and separates Georgia from Florida. It continues approximately and on an average as follows:

6. From Ellicott's Mound, south  $10^{\circ}$  east, about 10 miles; thence east 8 miles; thence north 24 miles; thence east 33 miles, following the St. Mary's River in its tortuous windings to the Atlantic Ocean.

7. Thence along the coast to the point of beginning at the mouth of the Savannah River; including all the lands, water, islands, and jurisdictional rights within said limits, and also all the islands within 20 marine leagues of the sea-coast.

Tybee Island Beacon is in latitude  $32^{\circ} 1' 16''$ , and longitude  $80^{\circ} 50' 9''$ .

## AREA OF THE STATE.

Georgia (with the exception of Florida) is the largest State east of the Mississippi; and since the dismemberment of Virginia, the largest of the original 13.

The area of the State, prior to 1802, when she ceded her western territory to the general government, exceeded 150,000 square miles, including the greater portions of the States of Alabama and Mississippi—viz., 46,200 square miles of the former, and 41,856 square miles of the latter. The precise present area is not accurately known—the coast and river lines being very irregular. It is generally given as 58,000 square miles, or 37,120,000 acres, which is probably below the true area.

The greatest length of the State is from north to south, 320 miles; and breadth, from east to west, 254 miles.

The geographical centre of the State is in Twiggs County, near Jeffersonville, about 20 miles south-east of Macon.

## TOPOGRAPHY.

Any fundamental study of a country and any thorough information as to its resources, must be based upon a knowledge of its topography and natural features. This is information as to the way in which God has made the country, upon which man can impress only slight and superficial changes—merely scratches upon the surface of nature.

For a real understanding of the topography of a country, a preliminary knowledge is necessary of certain principles, which explain the exact relations of ridges and slopes to valleys and watercourses. To the ordinary observer, these seem a mighty maze, and all without a plan; yet they have a plan governed by strict law, and have been reduced to well-understood principles which are universal in their application, extending to the whole surface of the earth, and embracing the smallest details of each separate division—each State, county, farm, and yard, even to the pettiest mole-hill or depression on the surface.

*Water* supplies the unerring test of relative elevation. The

tendency of water under the force of gravity is simply to descend toward the earth's centre by the shortest course. If interrupted, yet not arrested, it takes the shortest course practicable. It not only goes down hill, but goes down the steepest way—*i. e.*, it follows the *line of greatest slope*. Each individual drop of water pursues what, to it, is the immediate line of greatest slope, till it finds some level at which all forces counterbalance each other; and here only it remains at rest. The greatest slope for *it*—the one drop—may not be the line of *greatest general slope*; but the drop is infallible in selecting the greatest immediate slope from its own exact position.

The ocean is the great basin at which water usually finds its ultimate level. If the communication is obstructed, however, a lake or a pond or a puddle may furnish a resting-place; its banks giving the necessary reaction for an equilibrium of forces.

From the ocean, and from any considerable lake into which streams flow, there is a regular system of ramifications extending from this level, back to the remotest places, which form part of the water-shed flowing into the basin. The surface of the watercourses defines the lines of greatest slope in each principal stream, and in each confluent which empties into it. Each smaller stream, in its turn, defines another line uniting with the superior lines, and when at length no *running stream* exists, the course of each rill which carries off the rain, continues and completes the system. These lesser rills have their subordinate systems till the final irregularity is reached, which guides the single drop of rain along its devious course—following but one principle as modified by the impediments it encounters.

Remarkable it is, that instead of thousands of depressions, each constituting a lake or reservoir, the great mass of all the running water on the globe finds its way to the sea—to a single great reservoir. One conduit after another leads to it; each little drain finds its way into a larger sluice or duct, and this into a larger, till accumulated into rivers, the whole water-shed is drained at one mouth into the ocean.

The system of ridges and slopes is the exact counterpart of

the system of valleys and streams. The one system is the *glove*, the other is the *hand*, and the *fit is exact*.

*The Appalachian Chain.*—The leading feature on a grand scale of the topography of the country east of the Mississippi, is the Appalachian Chain of Mountains—a spinal column stretching from the promontory of Gaspé at the mouth of the St. Lawrence at the north, and melting away in Georgia and Alabama at the south.

The general line of the Atlantic coast, beginning at the south, is about north  $35^{\circ}$  east ; while the general direction of this great chain of mountains is more to the east of north—say north  $38^{\circ}$  or  $40^{\circ}$  east, approaching nearer to the ocean at the northern end. The length of the chain is about 1,300 miles.

The highest mountain-peaks are toward the extremities, north and south. At the north, the White Mountains—an outlying range—present the greatest elevation—Mount Washington, 6,288 feet. The culminating point of the entire chain, however, is at the south in North Carolina, the summit of the Black Dome being 6,760 feet ; and numerous peaks exceed 6,000 feet.

The *apparent* height of the White Mountains—rising from a base of but 500 or 600 feet—is greater than that of the North Carolina group, the base of which is about 2,000 feet above the sea-level.

The leading topographical features of all the Atlantic States, and indeed of most of the States east of the Mississippi, are determined by their relations to this great chain.

Where our special interest as Georgians begins in the chain, a decided change has taken place in some of its features. A great and final bend has occurred in its easternmost range, which becomes with us a cross range, running at right angles to the general course of the mountains.

This great chain has a western range of mountains which has the same characteristics of parallelism and uniform elevation, terminating in North-west Georgia. Lookout Mountain and the ranges near it—Raccoon Mountain, Missionary Ridge, Taylor's Ridge, and John's Mountain—are parts of this range—all having the same general direction, and the hog-back form. The north-east mountains are quite different in form—the ranges consisting more of a succession of peaks.

Across the whole northern boundary of Georgia, these ranges extend, reaching into South Carolina on the east, where Table Rock and Cæsar's Head rear their elevated peaks, to Alabama on the west, where the Lookout Mountain and others extend to the terminus near Guntersville. The whole northern border-line of Georgia, with its length of 150 miles, is among these mountains.

*Great Ridges.*—The chain of mountains which separates the Atlantic from the Gulf slopes is of various widths, extending even to 100 miles across ; but there is a narrow, absolute line, irregular and tortuous, yet never broken, which is the culminating ridge, and which winds its way at different levels and in different directions, from Cape Gaspé in Canada to Cape Sable at the southern extremity of Florida. This long, unbroken line, without width, separates the waters flowing into the Atlantic direct, from those flowing into the St. Lawrence and the Gulf.

From this long ridge two other dividing ridges run out—one at the north, separating the waters of the St. Lawrence from those of the Mississippi ; the other at the south separating those of the Mississippi from those which flow in the Gulf direct. These several long ridges constitute part of the tortuous rim of the great basin of the Mississippi.

The principal ridge entering Georgia from North Carolina, passes through the very heart of the State and runs to the southern extremity of Florida—all the waters east of it flowing into the Atlantic ; those west, into the Gulf. The Gulf slope itself is divided by a ridge separating the general slope from that of the great valley. The point where these two ridges meet is in North-east Georgia. Upon this critical point, a man with an umbrella in a shower will shed the water in three widely different directions. One part would reach the Atlantic at Savannah ; a second, the Gulf at Appalachicola ; while the third, after a long circuit, would reach the Gulf at the mouth of the Mississippi. This point is near the corner of Rabun, Towns, and White Counties, on Land lot No. 20 in the 6th District of the old Habersham County Survey—Land lot No. 100, 19th District, 1st Section, New Survey.

On the east of the great ridge in Georgia, called the Chatahoochee Ridge in its most elevated portion, lies the Atlantic

slope of Georgia, constituting over half of the State—about 30,000 square miles, or more. On the west, the Gulf slope, about 27,000 square miles—more than 40 per cent of the State.

Across the lines of greatest slope run another set—the lines of no slope, or perfectly level lines. The two together constitute the warp and woof of the surface. The former run nearly at right angles to the coast; the latter set of lines nearly parallel to it.

These level lines often mark old coast-lines, as the ocean receded from its former level. The retreat of the ocean has, in many places, left its actual marks. If we suppose the former water-levels gradually restored, marking the shore-lines accurately, we will best illustrate the actual lines upon land. The present level—the actual shore-line—is perfectly jagged and irregular. It runs in and out a thousand times. Not less but more so would be the other successive shore-lines by successive rises. Several successive plateaus would be developed, each cut by streams, and each preserving a rude parallelism to the present general shore-lines. As the ocean would rise into Middle Georgia, these plateaus would cease to preserve any generality of level, and the surface would be more broken and dotted with peninsulas and islands. With still succeeding rises, long and narrow tongues of land would run out between the intervening waters, irregular, yet rudely parallel to each other, and perpendicular to the general shore-line.

*River Systems and River-Basins.*—Upon the Atlantic slope, north of the Georgia coast, the course of the rivers and valleys is usually south-east. The rivers of Georgia which rise at the *end* of the mountain-chain, and not at its *side*, flow south-east, south, and south-west.

The river-basins of Georgia, and of the Atlantic coast generally, as also of the Gulf coast east of the Mississippi, are usually long and narrow—from 100 to 250 miles from the source to the sea, and from 30 to 50 miles wide, draining basins of from 3,000 to 10,000 square miles. The streams do not usually lie centrally in their basins, but to the west and south of the centres; the tributaries on the eastern side being much longer than in the western.

*Great Natural Divisions of Georgia.*—These are determined, not so much by ridges as by coast-lines. These indicate relative *altitudes*—the leading feature which affects climate and productions. By these lines, running nearly parallel to the present coast, the State is divided into three great divisions—viz., the Mountain Region, the Hill Country, and the Low Country.

Lower Georgia lies below the line joining the heads of navigation of the rivers, and is much the larger part of the State, with an area of about 35,000 square miles. It is below the level of 300 feet above the ocean.

Middle Georgia lies between the heads of navigation and the elevation of 1,000 or 1,100 feet, and has an area of about 15,000 square miles.

Above this is Upper Georgia, with an area of about 10,000 square miles, embracing nearly all the mountains of the State and much hill country.

The average elevation of the surface of Georgia, above the sea, is between 600 and 700 feet.

*The Mountain or Up-Country.*—The character of the mountains in North-eastern Georgia is quite distinct from those in North-west Georgia. In the north-east they constitute lines of separate peaks ; in the north-west, long, parallel ranges.

The Blue Ridge, which attains its maximum height of 6,760 feet in North Carolina in the peak of Black Dome, enters Georgia in the north-east corner, in Rabun County, having lost about 2,000 feet of its elevation, the Rabun Bald being 4,698 feet.

Another and longer chain (the Western Range of the Appalachian Chain, or Cumberland Range) enters Georgia between Rabun and Towns Counties ; cuts off Towns, Union, and Fannin, and recrosses the State line into Tennessee. This embraces Tray Mountain, an elevation of 4,437 feet.

Aside from the main ridge is the Brasstown Bald Mountain, or Mount Enotah—the highest peak in the State—4,802 feet, situated a few miles west of Hiwassee in Towns County. Blood Mountain in Union County attains a height of 4,460 feet.

From this long and curved chain strike out two other shorter chains—one extending into Union and Fannin Counties;

the other forming the Tallulah Mountains, and its extension, the Chattahoochee Ridge.

South of Tray Mountain lies Mount Yonah, a fine separate peak of 3,171 feet elevation. Another separate peak is the Currahee Mountain of 1,740 feet—about 800 feet above the surrounding country.

The general level of the counties forming the base of the mountains is quite elevated—Clarkesville in Habersham County having an elevation nearly equal to that of the Currahee Mountain. Every sort of surface is to be found—mountainous, hilly, broken, and knobby. The valleys are not usually wide. Between Tray and Mount Yonah lies the beautiful and fertile valley of Nacoochee.

*Scenery.*—The finest scenery of the State is to be found in North-eastern Georgia ; though much that is very fine is also found in the North-western section. A view from one of the peaks in the midst of the mountains is magnificent. To one unaccustomed to such scenery, it surpasses even his imagination. From the summit of Tray Mountain, for example, there are literally many hundreds of peaks in full view. The earth seems to have risen in huge billows, and suddenly hardened, leaving them standing. From the summit, reached after many arduous steps up and down (for, as a guide said with some simplicity, “You have to go down as much as up”—certainly as often—to reach the top), a half dozen or more long spurs reach off like buttresses, supporting the peak. Over and between these, you see other mountains—seeing the spurs also of those next to you—of the others seeing only the peaks. By distinctness of outline and by relative clearness and dimness, you distinguish distances. The buttresses and nearer mountains show the trees in bold outline, the foliage distinct, the coloring deep green. Dimmer grows the green and less distinct the outline, till in the dim distance only the blue slopes are discernible ; yet these assume all varieties of form. Nice shades of coloring enable you to distinguish the nearer ranges with no other relief than these delicate shades. The horizon seems afar off and ever receding as you rise.

It is a lonely view. No sign of human habitation or human culture disturbs the grand serenity. To witness the sun rise is a solemn spectacle. In the presence of the majestic earth

and this ball of fire, man feels himself to be nothing. Another presence is felt to be here even greater than these.

From Mount Yonah, a noble summit, separated from other mountains, a different and quite unique view is to be had. You see mountains as before on the one side—though more remote—and on the other, hill and plain, and the far-distant level horizon. So beautiful is the view, including the lovely valley of Nacoochee, that you scarcely could choose between the view from Yonah and Tray.

A lady from the low country, who had never seen a mountain before, made the ascent. Her friends requested her not to look round as she went up, that she might get the whole of the novel view at once. It was too much for her when she opened her eyes upon it all, and she wept like a child. "It is paradise!" she exclaimed; "It is heaven itself." And no wonder, for the earth so seen is very fair to see.

In North-western Georgia, the mountain-ranges have another aspect widely varying the character of the view. The view from Point Lookout, on Lookout Mountain, in Tennessee, just across the line, is noted. From this point, 7 States are visible; with a long stretch of the Tennessee River, the city of Chattanooga, and much cultivated country. A yet more elevated summit in Georgia, on this mountain, is called High Point. The mountain extends for more than forty miles, with a road upon its crest as level as the ordinary roads of the country. In many places, a traveller would not suspect himself to be upon a mountain.

#### CLIMATE.

Climate is in the air. Of all the powers near us, the air is the least manageable of our surroundings. It comes to us from afar, and goes when and as it pleases. We can partially isolate ourselves in houses, but the great mass of the atmosphere is beyond our control. We adapt ourselves to it—not it to us; and so we have to go to climate—it will not come to us.

Of the changes which take place in it, the sun's heat is the primary cause. The earth and sea are secondary causes by the absorption and radiation of heat; but this heat affects us only through the air. The sun, the earth, the ocean, latitude,

altitude, topography, all affect climate, and climate affects us ; but only through the air : so that the science of climate is the science of the atmosphere, and the conditions which affect it, as temperature, humidity, movement, etc. The circulation of water and the circulation of air are the leading conditions. Evaporation affects the humidity, the cloudiness of the atmosphere, and the rainfall from it.

Comparatively few as are the elements, they are on so grand a scale and so subtle as to have defied prediction. The attention paid to its laws has just begun to assume scientific form. The law of storms has only of late begun to be understood. The ability to predict the weather, even for a brief season, is a very recent acquisition. Now, mankind have gained a clue to the laws of the weather, and they have many facilities for following it, which they are not slow to use. Air, the Mercury of weather—the messenger of its influences to us—is being closely studied. The influences affecting it are everywhere too complex for any other mode of study except that of direct observation ; especially so in Georgia, lying between two seas and below the mountains.

The three great points of interest in climate are : (1) Temperature ; (2) Rainfall ; (3) Winds. The sun, directly or indirectly, is the origin of all. The sun's heat causes evaporation, clouds, dampness and rainfall. It affects relative pressure, and so promotes currents and creates the wind. The ocean-currents convey heat to the atmosphere above and temper the northern climates with warmth from the tropics.

The moisture received into the atmosphere by evaporation, and returned in rain to the earth, would cover its whole surface with a sheet, at the equator, measuring annually 10 feet in depth ; at the tropics, about 6 feet ; in the latitude of Georgia, 4 feet ; at 45°, 3 feet ; at the poles, 1 foot. Thus both temperature and moisture are carried from the tropical to the higher latitudes.

The temperature of the air falls, on an average, 1° Fahr. for every 300 feet of elevation. This would make a difference in Georgia of 16° by reason of relative elevation, between the shore-level and the highest summit. Latitude affects temperature, and there being 4½° difference of latitude between the

northern and southern limits of the State, this would make a difference of about  $9^{\circ}$  by the thermometer.

*Mistakes as to our Climate.*—"How hot does it get, though?" asked a tourist, finding the winter climate very delightful, and supposing it would be hard to express how hot the summer must be to pay for it all. "Not so hot as with you—in your cities, at all events. The warm weather begins earlier in the year with us than with you, and continues later; but the range of the thermometer is not so high in summer."

Such was the reply. To a stranger, the information about climate meets one of his points of greatest interest. These points are three—the negro, cotton, the climate.

For the year round, the climate is fine, especially of Middle and Upper Georgia. It is fine for out-door work or in-door work; for winter crops and summer crops.

On the temperature map, the mean annual temperature for the year round, below a line joining Augusta and Columbus, would be between  $68^{\circ}$  and  $64^{\circ}$ ; between the same line and a line nearly parallel to it, passing about 20 miles below Atlanta, between  $64^{\circ}$  and  $60^{\circ}$ ; another strip of territory, including Atlanta, between  $60^{\circ}$  and  $56^{\circ}$ ; Upper Georgia, between  $56^{\circ}$  and  $52^{\circ}$ ; the mountains, below  $52^{\circ}$ .

The entire range of mean temperature, not including the mountains, is, therefore, about  $16^{\circ}$ ; including them, perhaps  $20^{\circ}$ .

The line through the United States marking a mean annual temperature of  $60^{\circ}$  begins in South-east Virginia, above Norfolk, in latitude  $37\frac{1}{4}^{\circ}$ , passes above Raleigh in North Carolina, below Greenville in South Carolina, below Atlanta in Georgia, and leaves Georgia in latitude  $33^{\circ}$ . In Alabama it takes a turn upward, runs into Tennessee below Nashville, passes from Tennessee above Memphis, and runs with many curves to the Pacific, about latitude  $34^{\circ}$ —the same with Atlanta.

This is one of the choicest of all climates—that which ranges about  $60^{\circ}$ . The mean annual temperature of Atlanta is the same with that of Washington City, Louisville, and St. Louis. The winters of course are warmer in Atlanta, but the summers not so hot. These temperatures are derived from the reports of the Smithsonian Institute.

The mean climate of Clarksville and Gainesville in Upper

Georgia, corresponds with that of Central Ohio, Indiana, Illinois, Upper Missouri, and Lower Nebraska.

It must be remembered all the while that the winter climate in Georgia is warmer, and the summer range is lower to compensate—the difference in length of days increasing the summer range in the more northern latitudes referred to.

At New York, in midsummer, the days are very nearly one hour longer than at Savannah, and at Quebec one hour and a half longer, and the nights correspondingly shorter ; consequently at New York there is one hour longer for heat to accumulate from the direct rays of the sun, and one hour less time in the night for the accumulated heat to be carried off by radiation. This is the main cause of northern latitudes being hotter in summer than southern latitudes.

The mean annual isotherm of  $60^{\circ}$  on the other continent, passes through Spain, Italy, and Greece in Europe ; and in Asia, through Persia into China.

*Distribution of Heat.*—This is more important than the mean annual temperature. The latter may be very moderate and promising, but composed of elements of excessive heat in summer, and excessive cold in winter. These diversities, however, do not characterize the climate of Georgia. The extreme range is nearer to the mean than in more northern climates.

Another feature of distribution is in the diurnal changes as well as in changes of the season. Very sudden rises or falls of temperature are hurtful both to health and comfort. In this respect also our climate is favorable.

The winter weather at the north is usually the more important—the summer weather at the south ; the January mean temperature at the north—the July mean temperature at the south. But this importance at the south is not because the thermometer rises to so high an extreme as because of its range through the 24 hours. That extreme heat which causes sun-strokes, seeming to melt the brain, seldom occurs.

The isotherm of  $50^{\circ}$  January temperature, passes through Georgia ; and on the Eastern Continent through Spain, Italy, Greece, Palestine, Russia, Thibet, and China. The isotherm of  $82^{\circ}$  July temperature, passes also through Georgia, and through North Africa, Carthage, above Egypt, into Palestine about Jerusalem. This would make a range of  $32^{\circ}$  between

the mean temperatures of January and July. We have the winter climate of Rome ; the summer climate (yet more important to agriculture) of Jerusalem.

The United States Signal Service Chart shows the mean temperature of the hottest week of 1872, at 4.35 P.M., and of the coldest week of the following winter, 1872, at 7.35 A.M. The hottest temperature indicated in Upper Florida and Lower Georgia was  $94^{\circ}$ . The same temperature was marked at the junction of the Arkansas and Mississippi at Vicksburg, and at Jackson—considerably higher latitudes. The next highest temperature,  $93^{\circ}$ , embraced Wilmington, N. C., and Eastern South Carolina. That of  $90^{\circ}$  passed through Upper Georgia and then into much higher latitudes, including Virginia and Ohio, and reaching to Fort Benton on the Missouri River, in latitude  $48^{\circ}$ . The temperature of the coldest week in Middle Georgia was  $30^{\circ}$ .

TEMPERATURE TABLES.—The following tables indicate the temperature at the places and for the times named :

MEAN TEMPERATURE FOR AUGUSTA, SAVANNAH, AND TYBEE ISLAND LIGHTHOUSE, FROM MAY 1874, TO JUNE 1875, INCLUSIVE, AS REPORTED BY THE U. S. SIGNAL SERVICE BUREAU.				AVERAGE MONTHLY TEMPERATURE AT COLUMBUS, GA., FROM JUNE 1874, TO OCTOBER 1876, INCLUSIVE, TAKEN AT 8 A.M., 12 M., AND 6 P.M., EACH DAY, BY DR. E. C. HOOD.			
MONTHS.	AUGUSTA.	SAVANNAH.	TYBEE.	1874.	1875.	1876.	
May, 1874.....	72.5°	72.2°	....	..	47°	52°	
June, 1874.....	81.4°	80.7°	....	..	49°	50°	
July, 1874.....	78.5°	79.0°	78.5°	..	58°	54°	
August, 1874.....	78.8°	79.0°	79.0°	..	62°	65°	
September, 1874.....	74.7°	75.3°	75.8°	..	73°	73°	
October, 1874.....	63.5°	66.3°	67.8°	83°	81°	80°	
November, 1874.....	56.7°	59.6°	59.9°	83°	85°	84°	
December, 1874.....	49.1°	54.6°	54.3°	84°	79°	81°	
January, 1875.....	44.9°	49.7°	47.8°	76°	77°	79°	
February, 1875.....	46.9°	50.7°	49.3°	67°	62°	63°	
March, 1875.....	55.4°	59.2°	57.7°	59°	57°	..	
April, 1875.....	60.9°	62.5°	61.4°	51°	54°	..	
May, 1875.....	73.0°	73.0°	71.6°	....	62½°	..	
June, 1875.....	74.8°	79.4°	77.2°	....	62½°	..	
Mean for the time.....	63.4°	65.7°	65.7°				

Highest weekly average, 89°, 87°; lowest, 42°.

TABLE SHOWING THE MONTHLY MAXIMUM AND MINIMUM TEMPERATURES, ALSO THE MEAN MAXIMUM AND MEAN MINIMUM, AND GENERAL MEAN, AT MACON GA., FROM JANUARY 1871, TO OCTOBER 1876, INCLUSIVE, AS RECORDED BY MR. J. M. BOARDMAN, MACON, GA.

MONTH.	1871.				1872.				1873.				1874.				1875.				1876.				
	Maximum.	Minimum.	Mean Max'um.	Mean Min'um.	General Mean.	Maximum.	Minimum.	Mean Max'um.	Mean Min'um.	General Mean.	Maximum.	Minimum.	Mean Max'um.	Mean Min'um.	General Mean.	Maximum.	Minimum.	Mean Max'um.	Mean Min'um.	General Mean.	Maximum.	Minimum.	Mean Max'um.	Mean Min'um.	General Mean.
January.....	70°	31°	56°	36°	46°	68°	22°	49°	29°	38°	66°	23°	56°	36°	48°	72°	28°	57°	43°	56°	70°	20°	52°	39°	46°
February.....	75°	33°	60°	48°	54°	70°	32°	57°	40°	48°	74°	30°	59°	43°	51°	76°	30°	57°	43°	50°	78°	18°	56°	38°	46°
March.....	81°	39°	70°	55°	63°	78°	34°	60°	44°	52°	77°	33°	61°	41°	51°	78°	36°	66°	48°	57°	79°	30°	65°	46°	55°
April.....	84°	50°	74°	62°	68°	90°	45°	74°	60°	67°	86°	40°	73°	51°	62°	83°	40°	71°	52°	63°	80°	36°	72°	49°	60°
May.....	91°	51°	80°	64°	72°	90°	56°	85°	70°	77°	90°	40°	80°	62°	71°	92°	49°	80°	59°	69°	88°	48°	80°	60°	70°
June.....	91°	51°	83°	76°	78°	95°	71°	88°	72°	73°	90°	64°	83°	71°	77°	96°	70°	87°	67°	77°	98°	63°	87°	72°	79°
July.....	94°	70°	88°	75°	80°	99°	72°	91°	73°	83°	94°	73°	80°	72°	79°	94°	70°	86°	69°	77°	98°	74°	93°	77°	85°
August.....	98°	72°	86°	76°	81°	93°	70°	86°	75°	81°	92°	70°	83°	71°	78°	97°	70°	87°	70°	78°	98°	66°	83°	72°	77°
September....	88°	49°	83°	57°	70°	92°	63°	83°	69°	76°	92°	64°	81°	66°	73°	87°	62°	81°	65°	73°	92°	57°	79°	68°	74°
October.....	83°	46°	72°	64°	68°	82°	44°	71°	53°	62°	81°	40°	71°	50°	60°	81°	40°	72°	50°	61°	77°	33°	63°	58°	63°
November.....	76°	40°	62°	48°	55°	72°	30°	58°	42°	50°	78°	24°	60°	42°	51°	79°	26°	66°	46°	56°	76°	33°	64°	49°	57°
December....	66°	21°	51°	38°	45°	60°	20°	50°	35°	43°	72°	22°	55°	41°	48°	74°	26°	58°	40°	49°	77°	18°	60°	45°	53°
Means for the Year.....	82°	46°	72°	58°		83°	47°	63°	55°		83°	43°	70°	54		84°	45°	72°	51°		84°	41°	71°	56°	64°
Gen. Mean for the Year.....					65°.					63°.					62°.					63°.					

TABLE SHOWING THE MONTHLY MEAN TEMPERATURE AND THE MONTHLY MAXIMUM AND MINIMUM TEMPERATURE,  
FROM JANUARY 1872, TO OCTOBER 1876, INCLUSIVE, AT WEST END, NEAR ATLANTA, GA. RECORDED BY  
MAJOR S. B. WIGHT.

MONTHS.	1872.			1873.			1874.			1875.			1876.		
	Maximum.	Minimum.	Mean for the Month taken at 12 o'clock.	Maximum.	Minimum.	Mean for the Month, at Noon.	Maximum.	Minimum.	Mean for the Month, at Noon.	Maximum.	Minimum.	Mean for the Month, at Noon.	Maximum.	Minimum.	Mean for the Month, at Noon.
January...	63°	12°	45°	64°	8°	42°	69°	18°	49°	63°	11°	44°	71°	20°	57°
February.....	65°	20°	50°	68°	18°	51°	72°	28°	51°	67°	14°	46°	74°	16°	51°
March.....	70°	38°	54°	74°	14°	55°	76°	34°	57°	76°	32°	57°	75°	22°	56°
April.....	85°	38°	68°	84°	40°	67°	77°	39°	61°	78°	32°	66°	80°	42°	64°
May..	88°	56°	80°	90°	52°	77°	93°	50°	78°	81°	50°	77°	87°	46°	75°
June.....	92°	64°	83°	92°	62°	83°	95°	70°	85°	93°	63°	86°	93°	62°	83°
July.....	94°	74°	86°	94°	70°	86°	90°	72°	86°	93°	75°	86°	96°	60°	90°
August.....	92°	68°	86°	92°	68°	84°	96°	66°	85°	90°	66°	83°	95°	70°	88°
September.....	94°	62°	80°	90°	56°	75°	87°	55°	78°	90°	50°	74°	91°	50°	80°
October.....	82°	38°	68°	82°	28°	66°	81°	40°	69°	77°	38°	66°	78°	37°	66°
November.....	68°	16°	54°	70°	18°	55°	74°	28°	61°	77°	20°	59°	...	...	...
December .....	64°	10°	43°	70°	24°	48°	71°	29°	49°	71°	12°	55°	...	...	...
Means for the years.....	71°	41°	...	81°	38°	...	82°	44°	...	80°	30°	...	...	...	...
Gen'l Means for the years	...	...	66°	...	...	66°	...	...	67°	...	...	66°	...	...	...

*Rainfall.*—The prodigality of nature is illustrated in the enormous quantity of water which falls upon the earth's surface.

What is an inch of rain?

An English acre consists of 6,272,640 square inches, and an inch deep of rain on an acre yields 6,272,640 cubic inches of water, which at 231 cubic inches to the gallon makes 27,154 gallons; and as a gallon of distilled water weighs 10 lbs., the rainfall on an acre is 271,540 lbs. avoirdupois; counting 2,240 lbs. as a ton, an inch deep of rain weighs over 121 tons per acre. For every 100th of an inch in depth, 1.2 tons of water falls on an acre; and for every 10th of an inch, 12 tons.

It would require, therefore, a good wagon-load for 2 or 3 horses, to carry the water necessary for the 100th part of an inch in depth of rain on an acre.

On an average in Georgia, from 46 to 50 inches of rain falls in a year, making the equivalent of 5,600 tons or more of water on a single acre. Some idea may be thus obtained of the enormous supply nature furnishes. It would take 10 loads a day, every day in the year, to supply, on a single acre, the quantity of water which nature furnishes gratuitously. What would it cost to water a farm thus? a plantation? even a square in a garden? These facts give some idea of the impossibility of the irrigation of crops, except when water can be cheaply conveyed by natural forces to where it is needed. Irrigation also is intended only to *supplement* an insufficient rainfall. In the best situated countries for irrigation, an enormous system of canals and ditching is necessary. In the Scriptures, mention is made of "watering with the foot," and he will understand the expression who passes back and forth to a vessel, even to water a bed of strawberries.

Climate is essential. It must furnish us, free.

What becomes of it all? Much passes by streams into the ocean; much permeates into the ground; much is evaporated.

The distribution of rainfall, as that of temperature, is far more important than the actual quantity. The season at which it falls, and the intervals between rains, are the leading conditions affecting production. Excess and defect are alike injurious to crops. The distribution in Georgia is such as to

secure a good general average of crops, and the climate in this respect may be regarded as favorable.

There is seldom a failure—such as often occurs in countries excessively dry or excessively wet. June, July, and August are the most important months as affecting the main cultivated crops.

The following tables exhibit rainfall at the places and for the times expressed:

MONTHLY RAINFALL AT MACON, GA., FROM JANUARY 1871, TO OCTOBER 1876, INCLUSIVE. TAKEN BY MR. J. M. BOARDMAN.

MONTHS.	1871.	1872.	1873.	1874.	1875.	1876.
January.....	4.27	3.34	3.43	1.77	5.33	1.46
February.....	6.27	6.72	4.54	6.80	4.37	4.23
March.....	6.01	11.90	3.66	7.88	12.95	4.06
April.....	5.58	5.58	3.25	9.26	5.56	7.10
May.....	4.73	0.95	7.26	1.45	2.43	1.85
June.....	5.91	1.58	7.61	3.48	3.16	5.88
July.....	1.64	5.43	4.70	5.60	1.61	8.67
August....	5.52	4.61	5.33	5.23	7.68	2.47
September.....	11.96	1.47	3.58	1.27	3.94	2.93
October.....	2.50	0.40	0.26	1.42	0.67	2.96
November.....	8.85	5.34	3.90	2.03	4.48	....
December.....	5.95	3.38	2.96	4.09	1.63	....
Totals.....	69.19	50.70	50.48	50.28	53.81	....

MONTHLY RAINFALL AT COLUMBUS, GA., EXPRESSED IN INCHES AND DECIMALS, FROM JUNE 1874, TO OCTOBER 1876, INCLUSIVE. TAKEN BY DR. E. C. HOOD.

	1874.	1875.	1876.
January.....	....	5.05	2.79
February.....	....	5.57	4.16
March.....	....	12.34	7.90
April.....	....	7.57	9.17
May.....	....	2.80	4.45
June.....	9.72	2.07	4.81
July.....	10.50	2.25	3.50
August.....	1.41	6.41	5.31
September.....	2.29	3.09	0.62
October.....	0.19	5.99	3.96
November.....	2.69	4.66	....
December.....	6.51	3.88	....
Total.....	....	61.68	...

Greatest quantity in any week, 4.88.

MONTHLY RAINFALL AT AUGUSTA, SAVANNAH, AND TYBEE ISLAND LIGHTHOUSE, FROM MAY 1874, TO JUNE 1875, INCLUSIVE, AS REPORTED BY THE U. S. SIGNAL SERVICE BUREAU.

MONTHS.	Augusta.	Savannah.	Tybee.
May, 1874.....	3.88	4.85	....
June, 1874.....	3.29	4.85	....
July, 1874.....	5.35	10.14	4.55
August, 1874.....	6.81	6.58	3.68
September, 1874.....	5.85	8.89	5.90
October, 1874.....	1.09	1.42	1.23
November, 1874.....	2.21	1.80	1.65
December, 1874.....	4.04	1.66	1.41
January, 1875.....	6.77	8.84	6.02
February, 1875.....	5.11	3.50	3.16
March, 1875.....	11.88	6.88	6.26
April, 1875.....	4.71	5.11	3.54
May, 1875.....	1.10	3.20	1.43
June, 1875.....	6.59	4.10	3.12
Totals for the time.....	61.51	62.12	41.95

## MONTHLY RAINFALL AT WEST END, NEAR ATLANTA.

Showing the number of days on which rain fell in each month, and the quantity that fell (in inches and decimals) in each month, from July 1870, to October 1876, inclusive, taken by Major S. B. Wight. Lat. 33° 54' North; Long. 7° 28' West from Washington. Altitude, 1084 feet above the level of the sea.

	1870.		1871.		1872.		1873.		1874.		1875.		1876.	
	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.	No. of Days in which rain fell.	Amount of Rain-fall.
January.....	..	.....	4	2.03	4	2.94	6	3.36	4	3.14	11	5.60	6	3.32
February.....	..	.....	6	6.20	9	5.38	6	12.04	5	6.86	7	6.92	9	5.37
March.....	..	.....	7	6.11	6	7.66	5	2.58	10	7.38	11	10.27	6	5.59
April.....	..	.....	7	5.20	7	3.09	4	1.96	12	10.42	7	4.79	7	6.01
May.....	..	.....	10	7.77	7	3.75	9	6.05	2	3.00	5	1.84	10	5.00
June.....	..	.....	13	5.97	5	1.82	9	6.86	13	7.71	8	4.58	..	3.25
July.....	10	2.25	5	1.12	14	3.91	9	3.87	9	4.70	8	3.84	9	3.49
August.....	12	4.69	5	6.49	5	5.84	5	2.08	9	10.00	7	3.42	9	5.32
September.....	5	9.40	4	4.44	4	2.36	4	5.40	5	0.47	6	4.64	4	0.82
October.....	4	0.67	6	2.09	4	0.74	2	1.23	3	0.80	5	1.50	..	1.81
November.....	8	5.42	8	3.41	5	2.12	6	3.15	9	3.19	7	3.45	..	....
December.....	5	3.74	9	3.36	5	4.48	5	2.41	11	3.00	11	6.14	..	....
Totals.....	44	26.17	81	54.09	75	43.89	70	50.99	92	60.67	93	56.59	..	....

Average for 5 years : rained 83 days per year, and 53.33 inches fell per year.

*Notes by Major Wight:*

The largest amount of rain that fell in any *one day*, during this period, was September 29, 1870, 6.30 inches. The rainfall for several other days was as follows: August 27, 1871, 5.30 inches; August 16, 1872, 3.52 inches; February 7, 1873, 2.24 inches; February 12, 1873, 3.44 inches; February 16, 1873, 3.68 inches; August 29, 1874, 4.08 inches.

*Snow.*—1870—December, 2 days. 1871—November, 1 day; December, 2 days: total for 1871, 3 days. 1872—January, 1 day; February, 3 days; March, 2 days; December, 1 day: Total, 7 days. [N.B.—This record shows that there were 9 snows in the winter 1871–2.] 1873—February, 1 day. 1874—no snow. 1875—no snow.

The heaviest rains came generally from the south-west. The slow, steady rains were generally from the south-east. Prevailing winds were from the north-west. The average depth of 30 wells in the vicinity of these observations is 27 feet.

RAINFALL AT ATHENS, GA., IN THE MONTHS OF JUNE, JULY, AND AUGUST, DURING FOUR YEARS. FURNISHED BY DR. E. M. PENDLETON, PROFESSOR OF PRACTICAL AGRICULTURE IN THE GEORGIA STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.

MONTHS.	1873.		1874.		1875.		1876.	
	Rainy Days.	Rain in Inches.	Rainy Days.	Rain in Inches.	Rainy Days.	Rain in Inches.	Rainy Days.	Rain in Inches.
June.....	12	2.22	14	3.85	10	3.90	14	9.12
July.....	8	3.14	13	4.09	8	2.12	11	4.49
August.....	10	3.58	8	3.82	9	6.95	12	6.16
Totals.....	30	8.94	35	11.76	27	12.97	37	19.77

MONTHLY RECORD OF METEOROLOGICAL OBSERVATIONS BY THE DEPARTMENT OF AGRICULTURE, FROM FEBRUARY TO NOVEMBER, 1876, INCLUSIVE, AT ATLANTA (LAT. 33° 45' 19.8"; LONG. 84° 23' 29.7"; ELEVATION ABOVE THE SEA LEVEL, 1087 FEET). TAKEN BY P. H. MELL, JR., CHEMIST OF THE DEPARTMENT.

MONTHS.	TEMPERATURES.									BAROMETER.			WIND.			MOISTURE.		STATE OF WEATHER.		
	HEAT OF SUN'S RAYS.			RADIATION FROM EARTH.			TEMPERATURE OF AIR.			Maximum Height.	Minimum Height.	Mean Height.	Greatest Velocity per hour (miles).	Average Velocity per hour (miles).	Prevailing Direction.	Maximum per cent in the air.	Minimum per cent in the air.			
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.											
February.....	..	..	..	..	..	..	75°	25°	55°	29.948	28.843	29.065	15.	5.75	W	96	29	2.87	44.5	55.5
March.....	145°	73°	134°	54°	16.3°	38°	80°	43°	51.4°	29.255	28.380	28.861	19.8	9.04	W	100	21	1.64	54.	46.
April.....	189°	58°	127°	63°	32°	46°	88°	34°	60.8°	29.270	28.280	28.974	14.	6.70	W	93	28	2.09	57.	43.
May.....	161°	81°	135°	60°	34°	52°	89°	38°	68.9°	29.176	28.746	28.973	13.5	4.70	E & W	100	30	5.34	53.	47.
June.....	163°	95°	145°	64°	45°	59.9°	96°	59°	78.4°	29.070	28.697	28.874	10.6	4.80	W	100	26	1.96	55.	45.
July.....	165°	78°	153°	71°	50°	65°	95°	62°	81.8°	29.083	28.599	28.924	7.20	3.20	W	100	20	2.53	30.4	69.6
August.....	163°	111°	149°	69°	56°	62°	95°	69°	80.8°	29.064	28.772	28.924	5.70	3.76	E	100	40	5.21	27.9	72.0
September....	159°	119°	139°	61°	40°	50°	93°	47°	70°	29.086	28.808	28.947	7.50	4.4	W	100	40	1.46	52.	48.
October.....	150°	67°	131°	30°	30°	44°	80°	36°	58.4°	29.180	28.635	28.954	9.70	5.75	W	94	32	1.91	71.5	28.5
November.....	140°	49°	108.2°	90°	20°	37°	77°	24°	61.7°	29.136	28.627	28.864	12.9	6.40	N. W.	100	47	2.56	50.	50.

*Value of Weather Records.*—A record enabling us to review the weather for half a century or more, if faithfully kept in all portions of a territory as large as Georgia, would be very interesting and highly valuable. From such a record, we could draw reasonable probabilities. The Georgia State Department of Agriculture has tried to induce men in every section of the State to keep and furnish records of the weather with partial success. It is still pressing the matter.

The great facts which we wish to know agriculturally, are the distribution of heat, cold, and rainfalls; the seasons in which it rains, the way it rains as to gentleness or rapidity, the intervals between rains or length of drought, etc. We may have much information, and yet not know the most important facts.

In the two months of June and July of the present year, 1876, the number of days on which rain has fallen in the greater portion of Georgia has been sufficient, and so has the number of inches of rain; yet it has been so distributed, or rather so concentrated, that many things have suffered by excess of rain—small grain being damaged and the crops getting grassy; and since these rains a drought still more injurious. This illustrates well the necessity of dates, number, and amounts.

The general conditions affecting the climate of Georgia are well known, though exact details are imperfect. We have two exposures to the sea—the Atlantic and the Gulf—both affecting temperature and moisture. In mountain exposure toward the north, with small obstacles to the wind in other directions, there is a large quantity of woodland, well diffused. There is a marked distinction in the soil of the northern and southern parts of the State, both as to texture and color, and so in power of absorption and radiation of heat. We have slopes to the south-east and south-west inclining to the sun, and a considerable variety of altitudes. These conditions are quite complex, and render numerous observations necessary. Local variations of temperature and rainfall are numerous and considerable.

## II. THE PEOPLE.

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### RACE CHARACTERISTICS.

THE second great division of this work, and by far the most important, is THE PEOPLE.

We propose to treat of the People as to Race and Inherited Characteristics, and of the effect upon them of their circumstances and surroundings, for which the specific word now used is ENVIRONMENT.

The People constitute the great element in the determination of their own destiny. "There is more in the Man than there is in the Land"—more in the Man than in all else—of Nature and of Art.

No country better illustrates this truth than America as it is under the White, and as it was under the Red Man. Look again at California as a part of Mexico, and at the same country with its new population as part of the United States! Look at Liberty or McIntosh County in Georgia as it was under the control of the White man, and as it is now under the control of the Black!

Of the prodigious importance of Race and its permanent influences upon the destinies of the country, it is hard to form an overestimate. The slow, long process of race development or retrogression covers long periods, almost like the Geological Ages. The constitution of a race, with its corresponding elevation or depression, is the inheritance of successive generations—of good or bad environment and culture. It is the transmission of induced qualities—a species of wealth of slow accumulation, and fortunately of slow waste.

The broad range of race peculiarities, and the time it

requires to develop them, or the depth of the marks this time impresses, are not less striking. They are illustrated in the simpler organisms, by the difference in the varieties of plants and vegetables. One species of wheat is bearded, one of oats is rust-proof. They are susceptible of structural changes in the lapse of time ; yet have great *permanence of type*. They can be changed by intermixture, but by any other method the change of variety is *very* slow.

Race features are intensified by continuance of natural conditions, and by constant social assimilation. The changes in a People are analogous to the changes in an individual. In the periods of an individual life, what a difference between the undeveloped infant, the active man in the maturity of his powers, and the infirm man in his decay ! Yet while these broad general differences characterize each individual, each has still his own peculiarities, and can only be developed accordingly. So with a People—the difference between a People at any stage of progress or development being as marked as between individuals.

It is remarkable how widely the rule of variation amid uniformity extends. In the same race, with all the common features of resemblance, each people has its peculiarities, distinguishing it from others of the same race. Note the difference between the English people and their descendants in the United States ; also between these descendants in different *sections* ; yet each knows its own, and each of the others is recognized in his variations. These differences among the same race extend to counties and communities, and can be recognized by experts and those who habitually observe such things, and can be largely traced to their origin.

Leading men with their peculiarities modify the ways and manners of the common people. This law of assimilation prevails toward those who are admired—the opposite to those who are not admired. The Negro imitates the white man—the latter avoids the peculiarities of the Negro.

The American People are substantially an English stock, transplanted into a new environment, with the lesser race stocks engrafted upon it.

The Southern People are more unmixed English than those of any other section of the Union. Chiefly the descendants

of the English and the people of the Northern and Middle States—themselves descended from the English—neither the direct immigration from countries other than England, nor their descendants, have largely affected the Southern States.

The main influential race elements of the white population in the South are English and Scotch-Irish. This is especially true of Georgia.

#### CHARACTERISTICS OF THE PEOPLE OF GEORGIA.

The prevailing civilization of Georgia is similar to that of Virginia, from which a large part of our population was derived—greatest in influence, if not largest in number. North Carolina added the next largest element of influence in the Scotch-Irish, which also came partly from Pennsylvania and New Jersey.

The early settlements were upon the coast and large streams; and by degrees the country was populated inland. Savannah and Augusta are the oldest two cities. The youth of the State was thrifty. She grew up under easy circumstances. The contest with nature was comparatively small, and the active powers of men found occupation in the study of politics and human relations, more than science or nature. They were remarkably well informed upon the principles of government. The history of Georgia—of her State and Federal relations—her attachment to State Rights and the frequent bold and successful assertion of the same—are remarkable. The constitution of 1798 lasted till 1861; and the Judiciary Act of 1799 contains features which, after being law in Georgia for half a century, were adopted into the laws of Great Britain.

The social bonds which unite the people of Georgia are unusually close and complete. The great divisions of White and Black swallow up minor divisions to a very great extent; but in Georgia there is less separation than in the older and more settled South. There is no caste-ridden population in the State; and even in most of the cities, the circles are less defined than elsewhere. Society is firmly bound together upon a *just* rather than an artificial basis. The true philosophy of society is not caste, which separates, but union, which unites; not

separation, but combination—the association of the really fit—not of those designated by convention and included within artificial lines.

The effect on character of the contact of an inferior race with a superior, whether as slaves or as mere population, is always marked. Its tendency is to develop good or evil traits according to the peculiarities of the superior.

Of the Southern people, Georgians are regarded as the most practical and enterprising. In Northern prisons, during the late war, they were sometimes characterized as Southern Yankees. They really possess many of the good elements of both North and South. The Georgian has much common-sense and power of adaptation to circumstances. His speculative views yield readily to the practical. Put him on his mettle and he is apt to succeed. There is a good deal of candor in his composition, and he is generally sensible, observant, and energetic. Georgians, in the general aspect of all qualities combined, are unsurpassed. They may be lacking in some qualities possessed by others, but they have a just and balanced character, and their judgment of men and conduct is excellent.

On the whole, the English People are not to be surpassed for manliness. In the United States, no finer type of English manhood is to be found than in Virginia. Her statesmen and people have evinced this in many ways. They have a just, honest character—manly, noble, generous, and able. Their manners are natural, expressing their true character—not sharp nor narrow, but broad, open, collected, practical, and thoughtful.

The dominant element of the population and civilization of Georgia was derived from Virginia. Our representative men have had this bias. Public honesty—till reconstruction after the war brought the dregs to the top—was untarnished, except in one corrupt act, deeply repented of, the Yazoo fraud. No attempt on the public purse was made. During the present century up to the end of the war, there were no defalcations in high office, and not even a provision made for so inconceivable and unlooked-for an offence. There was little public debt, and no speculation.

Any account of the character of Georgians would be greatly lacking in individuality, which did not refer to a somewhat

rude and blunt independence, persistent perseverance, and self-reliance, which characterize them peculiarly. They are content with their own convictions, with little regard to authority or precedents, and proceed to put them into action.

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## THE NEGRO.

THE early history of the Negro race is but little understood. In the ordinary sense, they can scarcely be said to have any history ; but their constitution and nature—their habits and modes of life—have been studied.

Much of the recent information obtained by exploring the interior of Africa, is not applicable to them as we know them.

The ancestors of the Negro in the Southern States were nearly all brought from the west coast of Africa, from Upper and Lower Guinea, the region of Congo, and the slave coast just south of the equator, and rank among the lowest of this lowest race of mankind.

The works of Monteiro and the missionary to Africa, Rev. Mr. Bowen, supply valuable information. The former was a decided believer in the Evolution doctrine, while Mr. Bowen, being a missionary, entertained a different view ; but whether from the religious or the scientific standpoint, the conclusions of these two fair-minded men are remarkably coincident.

No one supposes that he understands the Chinese, Japanese, Persian, or other distant race, except by personal observation or by reading the books of observers ; but too many imagine they understand the Negro, who is far more remote in organization and civilization. It would benefit the world if those who think they understand the Negro character, without opportunity of learning, could be led to suspect the correctness of their views. Even the modifications of English character by change of country, require *contact* to be understood.

Immense interest has been felt in the Negro population of the Southern States. If any thing is to be prized by what it has cost, the Negro of the South may properly be considered one of prime regard ; and in the study of no other subject has there been manifested in so high a degree “that beautiful ease

and confidence which belong to the speculative philosopher, whose course is but little obstructed by facts." Men will listen to and endorse *speculations* on the Negro, who will turn an instant deaf ear to witnesses who testify the *facts* of his condition. It is often the case that the less one *knows* of the condition of this race, the greater is his confidence in his opinions.

To understand the Negro aright, it is necessary to know what he *was* in his native country, and what he *now*, after contact for some generations with a civilized and superior race. Too frequently the facts of his low organization and coarse nature are turned from with distaste, and the facts of his condition studied by the aid of imagination and romance, instead of observation and correct testimony. Yet the prejudices of the most determined in their foregone conclusions, usually give way rapidly as they come into any real actual contact with the Negro ; and they usually have far less patience with him than those who really understand him.

To appreciate the changes wrought by contact with the whites, we must, as before said, understand him as he was in Africa. Perhaps the most fully informed writer on the condition of the race in their native country is Monteiro, a Portuguese, who has recently published the results of a number of years of experience and observation among the Negroes of Lower Guinea. He thinks the climate accounts for many of his physical and mental characteristics. He says :

"It would be very singular indeed if a peculiar adaptation for resisting so perfectly the malignant influences of the climate of tropical Africa—the result of an inferior physical organization—was unaccompanied by a corresponding inferiority of mental constitution. It is only by the theory of 'natural selection,' or the 'survival of the fittest,' to resist the baleful influences of the climate through successive and thousands of generations—the fittest being those of greatest physical insensibility—that the present fever-resisting, miasma-proof Negro has been produced ; and his character can only be explained in the corresponding retardation or arrest of development of his intellect."

Again he says :

"It is really astonishing to see the naked Negro without a particle of covering on his head (often shaved), in the full blaze of the fierce sun—his daily food a few handfuls of ground-nuts, beans, or mandioca roots, and often the most unwholesome water to drink. At night he throws himself on the ground anywhere without a pillow, and wakes in the

morning generally wet with the heavy dew, and does not suffer the least pain or inconvenience."

These extracts give a faint idea of the Negro in his native wild. Others might be given which would show more fully his normal savage condition, but this is deemed unnecessary to the intelligent reader. The proper criterion by which to compare the Negro in African slavery (for it was from that class of Negroes in Africa that the importations to America were made), is the condition of the Negro slave in Africa with the Negro as seen to-day in America. Those imported into America were transferred from slavery to savages, to slavery to civilized white men.

The condition of 4,000,000 of Negroes in the Southern States—civilized, clothed, and to a great extent Christianized—presents a marked contrast with that of their brethren in Africa, notwithstanding the efforts of zealous missionaries to Christianize and civilize the natives in their own country.

The improvement in comfort, happiness, and civilization between the present Negro in America, and the native African, either when the first importation was made or at the present time, is too great to admit of comparison. More Negroes are brought under the influence of the Christian religion in Georgia in one year than in both the Guineas in 1,000 years.

Thus much for the advantage derived by the Negro from being transplanted from African to American slavery—the only way in which such a transformation of character could have been effected, since by no other means could he have been thrown in such immediate, friendly, and constant contact with a superior race.

Marked and astonishing as the improvement has been from the African savage to the present Negro of Georgia, many of his native characteristics have not been extirpated. Among these may be mentioned his superstition extending into secular and religious matters, his want of respect for the truth, disregard of the rights of property, and peculiar absence of reasoning faculties. In his new *rôle* of citizenship, these peculiar characteristics have been somewhat augmented.

As an element of production the freedman involves a difficult problem. As a laborer, under proper control, he is perhaps the best that can be had at present, for the culture of cotton,

sugar-cane, and rice ; but when the present generation of trained laborers passes away—the rising generation being reared without control and in habits of idleness—fears are entertained by the most thoughtful and observant, that the Negro will cease to be an element of production.

There is a tendency on their part to collect around towns and cities, where a precarious subsistence is secured by menial services, which they generally perform “by the job,” being usually unwilling to contract for full and regular employment. The same disposition is manifested by them in the rural districts, where they insist upon working for a “share of the crop” in preference to hiring for wages, either by the month or year, because it gives the employer less control of their time.

There is also a tendency with some to remove to the Southwest, under the influence of higher wages offered for farm labor. This emigration is mainly from among the unsteady and least industrious of the race, while the more thoughtful, stable, and respectable, generally refuse to leave the place of their nativity.

They are an improvident people, both by nature and habit, and, even now that they are free, need daily direction and supervision by a superior mind. A few of the more intelligent and prudent among them, conscious of this necessity, employ white men of experience to supervise and direct them in their own work, when they rent lands on their own contract. The females are fast withdrawing from field labor, and becoming a burden upon the labor of the males ; though, when slaves, they were an important element of production.

It is even now a debatable question with the thoughtful political economist, whether the Negro population of Georgia is self-sustaining ; even the intelligent Negroes themselves, who, having been trained as slaves to regular systematic labor, and now are comparatively industrious from habit, look forward with forebodings to the future of their race, when they contemplate the rising generation growing up in ignorance of useful and available arts, or knowledge of the methods of performing any work, and generally without parental control. Very few are learning trades—less than during the existence of slavery ; and there will therefore be fewer of the next generation of laborers receiving wages as skilled employés than now.

There were, last year, admitted to the public free schools of the State of Georgia 55,268 Negroes, many of whom have made remarkable progress in those branches which require an exercise of the memory ; but generally fail in those branches of learning which require the exercise of the reasoning faculties. The State makes an annual donation of \$8,000 to a college located in Atlanta, and devoted to the education of Negroes.

The change in the relations of capital and labor by emancipation was so sudden and radical, that the equilibrium of those forces was completely destroyed. Old ideas and the practice and experience of a century were necessarily revolutionized, and men old in years and experience had to begin the world anew. The new relations are now beginning to assume some stability, and both Negroes and Whites seem to have accepted the situation in good faith, and, in Georgia at least, are working, each in the sphere so plainly indicated by the Creator in the physical, mental, and moral characteristics of the two races.

Whatever romance writers and universal philanthropists, who are totally ignorant of Negro character, may say or write to the contrary, their inferiority to the white race in the higher elements of manhood is a fact too well established by history and observation to admit of question.

The future of the Negro in America is a problem which time alone can decide.

As an element in politics, his career is virtually at an end, except to increase the number of representatives from the Southern States in the Federal Congress.

As an element of consumption and destruction, he is destined to play an important part.

As an element of progress and higher development, those who know him best assign him a low position.

As a factor in the increase of population, his race must of necessity decline in ratio to the whole, since he is confined to natural increase, which is checked by defective moral restraint, but not by prudential motives ; while the white man has both the sources of natural increase and immigration, from which to draw recruits for his swelling multitudes, aided by intelligence and prudence.

## POPULATION.

THE population of Georgia in 1870 was 1,184,109. Of these 638,926 were white, and 595,192 black. Only 11,127 were foreign born.

The number of families in the State was 237,850, and the average was 5 persons to a family.

The number of dwellings was about the same as families, 236,436.

Of persons in Georgia, 48.9 per cent are males, and 51.1 per cent females; 54 per cent are Whites and 46 per cent Negroes. Of militia, between 18 and 45 years of age, 9.1 per cent are Whites and 7.9 per cent Negroes. Of voters over 21, 10.9 per cent are Whites and 9.1 per cent Negroes.

The centre of population of Georgia is in Monroe County near the Ocmulgee River, about 10 miles—a little north of east—from Forsyth.

The centre of *white* population is on the border of Monroe and Butts Counties (near Dublin, Butts County), and about 12 or 13 miles north-east of Forsyth.

The centre of population is about 40 miles north-west of the geographical centre. The centre of total population differs only about 10 miles from the centre of white population.

Of the people of Georgia, 6 per cent are engaged in manufacturing; 4 per cent in trade and commerce; 15 per cent in professional and personal services; and 75 per cent in agriculture.

## CAPACITY OF GEORGIA FOR POPULATION.

Japan, with 30,000,000 of acres in cultivation, sustains a population of 33,000,000 without importation of food. The land, however, is fine, splendidly cultivated, highly manured, irrigated, and improves in value.

The agricultural population of Georgia is 888,000, and there are about 500,000 acres in cultivation. Upon a system of intensive cultivation, it might perhaps sustain a population 3 times as great on the same land. Were Georgia as thickly settled as Massachusetts, the population would exceed 10,000,000.

## INSTITUTIONS OF THE PEOPLE.

GOVERNMENT OF THE STATE—THE PRESENT CONSTITUTION  
OF 1868.

**SUFFRAGE.**—A voter must be a male person, 21 years old, born in the United States or naturalized or one who has declared his intention to be naturalized, or a *resident* at the time of the adoption of the Constitution. He must have resided in the State 6 months, and 1 month in the county in which he votes, and must have paid his taxes for the preceding year. Residence as a soldier or sailor of the United States is not sufficient. The disqualifications are treason, malfeasance in office, duelling, and any penitentiary offense. It declares the right of suffrage to be inalienable.

**BILL OF RIGHTS AND LIMITATIONS IN LEGISLATION.**—The social status of a citizen is declared to be not a subject of legislation. There shall be no imprisonment for debt ; no whipping as a punishment for crime.

**STATE TAXATION.**—A poll tax not exceeding one dollar shall be collected, and devoted to educational purposes. Taxation shall be uniform on all sorts of property, and *ad valorem*. Power to tax may be given to counties and municipal corporations for their purposes.

**LEGISLATIVE DEPARTMENT.**—This consists of 2 houses—the Senate and House of Representatives—called the General Assembly. It meets annually on the second Wednesday in January, and the session is 40 days, unless prolonged by vote of two-thirds of each house. Disqualifications for either house are wrought by felony, larceny, duelling, or removal from the district.

The Senate consists of 44 members, each elected for 4 years—22 going out every 2 years. The districts were fixed by the Constitution to consist of 3 counties each, the State then having only 132 counties. Since that time 5 new counties have been created, and each of these by the act creating it was attached to the senatorial district of which it was a part before being set off as a new county.

The House of Representatives is composed of 175 members, as follows : 3 representatives each from the 6 most populous counties ; 2 each from the 26 next most populous ; and 1 each from the remaining 105 counties. A change in the apportionment may be made after each federal census, but the number of members can not be increased beyond 175.

EXECUTIVE DEPARTMENT.—The Governor is elected for 4 years. He has the veto power, the pardoning power, and the appointment (with the concurrence of the Senate) of the following officers—viz. : Judges of the Supreme Court, Judges of the Superior Courts, Attorney-General, Commissioner of Agriculture, State School Commissioner, State Geologist, Solicitors-General, Judges of County and City Courts where established by special law, and Notaries Public.

The Secretary of State and Surveyor-General (the two offices being consolidated), the Comptroller-General, and State Treasurer, are elected by the General Assembly every 4 years.

JUDICIAL DEPARTMENT.—The Judicial Department of the Government consists of the following courts—viz. : the Supreme Court, Superior Courts, Courts of Ordinary, Justices (of the Peace) Courts, and “such other courts as may be established by law.” In conformity with this provision, County Courts have been established in several counties, and City Courts in some cities.

The Supreme Court is for the *correction* of errors, and consists of 3 Justices appointed at first for 4, 8, and 12 years, and each subsequent appointment for 12 years. Its sessions are in Atlanta.

The Superior Courts are held in every county of the State. Each Judge has a judicial district or circuit, composed of a certain number of counties, there being 20 circuits and 20 Judges in the State. These Judges are appointed by the Governor for 8 years. Nearly all important matters of controversy come within their jurisdiction.

The Constitution provides that Jurors shall be upright and intelligent citizens.

HOMESTEAD AND EXEMPTION.—The Constitution provides that each head of a family, or guardian or trustee of a family of minor children, shall be entitled to a homestead of realty to the value of \$2,000 in specie, and personal property to the

value of \$1,000 in specie ; and no court or ministerial officer in this State shall ever have jurisdiction or authority to enforce any decree or judgment or execution against any property so set apart, except for taxes, purchase money unpaid, or expenses incurred in its improvement. The Supreme Court of the State has held that this exemption or homestead is not good against contracts made before the adoption of the Constitution, and the Supreme Court of the United States has confirmed this decision of our State Supreme Court.

The Supreme Court of this State has also defined the right of minor children under this provision, and held that property mortgaged by the father in his lifetime can not, after his death, deprive his minor children of a homestead in the mortgaged premises.

The Supreme Court of this State has, however, held that the head of a family can, as such, *wave* his right to a homestead in a specific property, and the right to claim and obtain such homestead as the agent of his wife ; that the right to claim a homestead does not compel a man to do so, and he can do so or not, as he chooses. He is entitled to it if he *desires* it, and not otherwise.

WIFE'S ESTATE.—A wife, notwithstanding marriage, continues to be the legal owner of the property she possessed at the time of marriage, and of any that accrues to her by gift, bequest, or her own acquisition after marriage.

DIVORCE.—No total divorce shall be granted except upon the concurrent verdicts of two juries. When a divorce is granted, the jury rendering the final verdict shall determine the rights and disabilities of the parties, subject to the provision of the Court.

EDUCATION.—The Constitution requires the establishment of a thorough system of general education, forever free to all the children of the State. The Public Schools of the State, and the distribution of the fund for the support of the same, are under the control of the State School Commissioner.

#### LAWS OF PRESENT GENERAL INTEREST.

WILLS, DISTRIBUTION OF ESTATES, ETC.—A testator may do what he will with his own, not to the prejudice of his credi-

tors ; and his wife is so far a creditor that he can not defeat dower except by consent ; nor can he entail property.

In case of *Intestacy* the distribution of an estate is made as follows : After payment of expenses of administration, of a year's support to the family, and the debts of the intestate, the remaining property goes—1. To the husband, or husband's children, if any, of a deceased wife ; 2. To the wife, or wife's children of a deceased husband—the wife having the one fifth part if there are more than 4 children ; 3. To the children ; 4. To the father, mother, brothers, and sisters of the intestate.

The children or grandchildren represent a deceased distributee ; this rule not extending beyond the grandchildren of a brother or sister.

Upon the death of an intestate, his widow may elect to take a dower or one third interest for life, in the lands of her deceased husband, and share and share alike with the children in the personal property ; or she may relinquish her right of dower and take a child's part, share and share alike, in all the property, to be her own absolutely.

**COLLECTION OF DEBTS.**—A Justice of the Peace has jurisdiction in all civil cases where the principal sum involved does not exceed \$100 ; and 10 days' residence in a Justice's district is sufficient to give jurisdiction. If the amount is under \$50, suit can be brought and trial had in 15 days ; if over \$50, in 20 days. If either party is not ready, the Justice may continue the case upon a sufficient legal showing for a reasonable time, not more than 10 days ; but neither party shall have more than one continuance except for providential cause.

When a case is tried, the Justice renders judgment enforced by execution. The execution must be issued in 4 days, and the sale of property advertised 10 days, if the property levied upon is personal. No lands can be levied upon to satisfy a Justice Court execution, unless no personal property can be found liable thereto. If land is levied upon, the levy must be made, and the execution turned over to the Sheriff, who shall advertise the sale 4 weeks before the first Tuesday in the month, and sell at the court-house door.

Either party dissatisfied with the decision of a Justice of the Peace, can carry the case to the Superior Court upon appeal, if the sum is over \$50 ; or by *certiorari* if \$50 or less.

**LIENS.**—These are established by law and attach to property for taxes, for judgment or decree of court, and in favor of laborers, landlords, mortgagees, merchants, factors and others furnishing supplies, mechanics, contractors, innkeepers, and a few other cases.

Liens for taxes have the highest rank, and must be satisfied before all others. Laborers' liens are next, and attach for labor performed, to the general property of their employers. They are superior to all other liens except for taxes and the special liens of landlords on yearly crops, and the special liens of factors for supplies furnished. The landlord's lien for rent on the crop produced, is superior to all others against the crop except for taxes. Factors, merchants, landlords, dealers in fertilizers, and all who furnish necessary supplies with which to make a crop, have a superior lien upon the crop except for taxes and labor.

All mechanics of every sort, who have taken no personal security, shall have a lien upon the property upon which they work (including the real estate upon which it is located), for work done or material furnished, in building, repairing, or improving any property. To make good such a lien, it must be recorded in 30 days, and suit brought for the recovery of the money in 12 months.

**TAXES.**—The rate of taxation for State and county purposes varies from year to year, from 80 cents to \$1 on each \$100 worth of property. Church and school property is not taxed ; and all money invested in the manufacture of cotton, wool, and iron, is exempt from taxation for 10 years from the date of the investment.

**RECORD OF CONVEYANCES.**—All titles to land and mortgages on land, must be recorded within 12 months from their date.

**ARBITRATIONS.**—The laws provide for parties having disagreements to submit their case to arbitrators whose awards are binding. This affords a speedy and satisfactory method of settling controversies without the expense of a trial before the courts.

#### THE LAND POLICY OF GEORGIA.

The tenure of land is, in every country, one of the most important features of its policy, and one which has, accordingly,

attracted much of the attention of statesmen and the discussion of political economists. The policy in England, in France, and in the United States has been quite various.

In the United States it has become more uniform. In England, nearly nine tenths of the land is held by 12,000 persons. In France there are many small holdings.

In Georgia, the doctrine of many of the political economists, that land is worth *only what is put upon it*, has been more thoroughly practiced than, perhaps, in many other States.

HEAD RIGHTS.—Originally in Georgia, land was held in what was called in law “tail male,” but this policy was changed at an early period. An Act was passed in 1777, shortly after the Declaration of Independence, for opening a Land Office, and for the better settling and strengthening the State, and to encourage immigration, granting to every free white person (the head of a family) 200 acres of land, and 50 acres for each member of the family (including Negroes) not exceeding 10 in number. This was the first *Head Right* law ; but the war of the Revolution being then in progress, it failed of its purposes.

In 1780, it was renewed, and the Land Office located in Augusta, because the low country was in British occupation, the Act reciting that “the rich and healthy lands in Wilkes County and elsewhere remain unsettled, to the great detriment of commerce and strength of the same, while many of the citizens of this State are suffering by their lands being in the hands of the enemy.” After the close of the war, much of the legislation had reference to thus settling the State.

The Head Right country includes all the territory south of Franklin, Banks, and Jackson Counties, and east of the Oconee River, and was all acquired from the Indians before the Declaration of Independence.

INDIAN TREATIES.—After the Revolutionary War, the remaining portions of the State were acquired by successive treaties made by the Federal Government. The land thus acquired was distributed by successive LOTTERIES among the free white male citizens of the State over 18 years of age. Every such citizen, who had not previously drawn, was entitled to one ticket ; if a husband or father, to two tickets; certain officers

and soldiers to two ; widows and orphans were included in the distribution.

The lands taken up by Head Rights were wholly irregular in form, each man pursuing his own taste in shaping the land selected, and varying the lines to include the best lands. The remaining portions of the State, distributed under the lottery system, were regularly surveyed.

LAND LOTTERIES OF THE STATE.—There have been 8 distributions of land by Lottery, as follows :

*1st Lottery.*—Lands acquired from the Creek Indians by Treaty of Fort Wilkinson, June 16th, 1802, disposed of by the Lottery of 1805, under Act of May 11th, 1803. It consisted of two separate bodies of land in different sections of the State—the first a long strip of country on the West side of the Oconee River, from High Shoals on the North to the mouth of Palmetto Creek on the South, and was then designated as Baldwin and Wilkinson Counties. The line began at the upper extremity of High Shoals on the South bank of the Appalachee River, and ran nearly South to a noted ford on Chatto-chucco-hatchee—now called Murder Creek ; thence inclining slightly to the East to a point where a noted path (leading from Rock Landing to Ocmulgee Old Towns) crossed Commissioner's Creek ; thence inclining still more to the East, to where the Uchee path crossed Palmetto Creek ; and thence down the creek to its mouth. This territory now includes parts of Morgan, Putnam, Baldwin, Jones, Wilkinson, and Laurens Counties. It was divided into 10 Land Districts—5 in Baldwin and 5 in Wilkinson ; and the Districts were divided into Lots of  $202\frac{1}{2}$  acres each.

The second portion of this Lottery was then called Wayne County. It began at the mouth of Goose Creek on the south bank of the Altamaha River, running south  $3^{\circ}$  west, a direct line, to Ellicott's Mound on the Florida line, and included all eastward of that line to McIntosh, Glynn, and Camden Counties, the lower end of this body being defined by the tortuous course of the St. Mary's River. It was divided into 3 land districts, and these into lots of 490 acres each. It now includes parts of Wayne and Charlton Counties.

*2d Lottery.*—Lands acquired from the Creek Indians by Treaty of Washington of November 14th, 1805, and, under Act

of June 26th, 1806, was distributed by Lottery in 1807, and embraced all the territory between the Oconee and Ocmulgee Rivers not included in the first Lottery, and South of (the present) Walton and Newton Counties. This territory was added to Baldwin and Wilkinson, by which these two counties then constituted all the land South of the present lines of Walton and Newton, and between the Oconee and Ocmulgee. The dividing line between the two counties as then constituted began at Fort Wilkinson on the Oconee, a short distance below Milledgeville, and ran South 45° West to the Ocmulgee River. All above this line was Baldwin, and all below was Wilkinson. The territory included in this second Lottery was divided into 38 Land Districts, and these into lots of 202½ acres each. It now includes, either in whole or in part, the Counties of Morgan, Jasper, Putnam, Jones, Wilkinson, Twiggs, Pulaski, Laurens, Telfair, and Montgomery.

*3d Lottery.*—Lands acquired from the Creek Indians by Treaties of Fort Jackson, August 9th, 1814, and the Creek Agency on Flint River, of January 22d, 1818, comprising most of the southern and south-western portions of the State ; and land acquired from the Cherokees by Treaty of the Cherokee Agency, July 8th, 1817, and situated in the northern portion of the State—all distributed by Lottery of 1820 under Act of December 15th, 1818. The southern part of this Lottery was divided into Early, Irwin, and Appling Counties. It embraced the entire southern portion of the State West of Wayne, and included the present Counties of Decatur, Thomas, Brooks, Lowndes, Echols, Clinch, Ware, Pierce, Appling, Coffee, Irwin, Berrien, Colquitt, Dougherty, Mitchell, Baker, Calhoun, Early, and Miller ; and parts of Charlton, Wayne, Wilcox, Worth, and Clay. This territory was defined on the North by a line commencing at the mouth of Sommochee Creek on the East side of the Chattahoochee River, and running due East on the line which divides Randolph, Terrell, and Lee Counties from Calhoun and Dougherty, to a point 2¼ miles East of Flint River. A line from thence due South to Florida, marked the eastern line of Early County, which then occupied the whole south-west corner of the State. Then continuing the above-named Northern boundary-line from the corner of Early County, due east, to a point near the

middle of (now) Worth County, and from thence North 45° East, to the Ocmulgee River, a little South of the mouth of Cypress Creek in Dodge County ; thence down the Ocmulgee and Altamaha to the mouth of Goose Creek on the Wayne County line. All this large tract between Wayne County on the East and Early on the West, was divided by a line beginning on the South side of the Ocmulgee at Blackshear's Ford (nearly South of Jacksonville, Telfair County), and running due South to Florida—West of this line being Irwin and East of it Appling County. Early County was divided into 12 Land Districts, and these into lots of 250 acres each; Irwin into 16 Districts and Appling into 12—the Districts in the last two counties being divided into lots of 490 acres each.

The territory in the northern portion of the State included in this Lottery was designated as Walton, Gwinnett, Hall, and Habersham Counties. Its boundaries were strangely irregular. Beginning at High Shoals, the line ran South-west along the upper line of Morgan and Jasper Counties to the Ulcofauhat-*chee* (or *Alcovy*) River ; thence up said river to a point a few miles North of the Georgia Railroad; thence following the old Hightower Trail to the Chattahoochee River ; thence up the river to the mouth of the Souquee ; thence by a line North to the Tallulah River ; thence down Tallulah to its junction with the Chattooga ; thence South to the Chattahoochee Ridge ; thence South-west along said Ridge to Hog Mountain ; and thence down the Appalachee River to High Shoals. Walton and Gwinnett Counties were then defined by lines very nearly as they are now. Hall was a very narrow strip on the South-east side of the Chattahoochee, between Gwinnett and Habersham. All this territory was divided into 13 Land Districts whose lines were parallel to the dividing lines of Walton and Gwinnett. The Districts were divided into lots of 250 acres each.

*4th Lottery.*—This was of a small portion of the lands acquired from the Cherokee Indians by Treaty of Washington of February 27th, 1819, and distributed about December or January, 1820–21, under Act of December 19th, 1819. It consisted of additions to Hall and Habersham Counties and all of Rabun County. It was defined by the Chestatee River, commencing at its junction with the Chattahoochee, and

following very nearly its course to the Blue Ridge; then following the Ridge to the North Carolina line; then following the lines dividing Georgia from North and South Carolina to the junction of Chattooga and Tallulah Rivers. It included all of (the present) Rabun and White Counties, small portions of Habersham and Lumpkin, and all of Hall North of the Chattahoochee. The territory by this Act added to Hall was divided into 3 Land Districts, and the lots having 250 acres each. The part added to Habersham was divided into 6 Districts, and Rabun County into 5 Districts. The 5th and 6th Districts of Habersham, and the 1st, 3d, 4th, and 5th of Rabun, were divided into lots of 490 acres; and the 1st, 2d, 3d, and 4th of Habersham, and the 2d of Rabun, into lots of 250 acres each.

*5th Lottery.*—This Lottery was of lands acquired from the Creek Indians by Treaty of Indian Springs, January 8th, 1821, and distributed under Act of May 15th, 1821, by Lottery drawn near the close of that year, and was then divided into Dooly, Houston, Monroe, Fayette, and Henry Counties. It consisted of all the territory between the Ocmulgee and Flint Rivers, and extended from the Chattahoochee River on the North to the line of the third Lottery on the South. It embraced the present Counties of Dooly, Houston, Crawford, Monroe, Upson, Pike, Butts, Spalding, Fayette, Clayton, Henry, De Kalb, Fulton, and Campbell, and parts of Newton, Coweta, Macon, Worth, Wilcox, Pulaski, and Bibb. Each of the 5 original Counties named in the Act was divided into Land Districts 9 miles square, and these into lots of  $202\frac{1}{2}$  acres each.

*6th Lottery.*—This Lottery was of land acquired from the Creek Indians by Treaty of Indian Springs, February 12th, 1825, and was distributed by Lottery of 1827, under Act of June 9th, 1825. It consisted of all the territory between the Flint and Chattahoochee Rivers North of the 3d Lottery line, and extended North beyond the Chattahoochee to the Cherokee Indian boundary. The criminal jurisdiction of the Counties of Dooly, Houston, Fayette, and Pike was extended to cover all this territory. It consists of the present Counties of Quitman, Randolph, Terrell, Lee, Sumter, Webster, Stewart, Chattahoochee, Marion, Schley, Taylor, Talbot, Muscogee, Harris, Meriwether, Troup, Heard, and Carroll, and parts of Haralson,

Douglas, Coweta, Macon, and Clay. It was divided into 5 Sections, the 1st being attached to the criminal jurisdiction of Dooley, the 2d to Houston, the 3d to Pike, the 4th to Fayette, and the 5th to Pike Counties. The Sections were divided into Land Districts 9 miles square, and these into lots of  $202\frac{1}{2}$  acres each.

*7th Lottery.*—This was of lands acquired from the Cherokee Indians by Treaty of Washington, February 27th, 1819, comprising the entire north-western portion of the State, or all the territory of Georgia not included in the Head Right Country, and previous Lotteries. It was known that Gold existed in paying quantities in this territory, and on December 2d, 1830, the Legislature authorized the Governor to take possession of the Gold Lands and punish all who should trespass upon them.

The entire territory was called Cherokee County, and was divided into 4 Sections. The 1st was all East of a line beginning 36 miles West of the north-west corner of Rabun County on the line of North Carolina, and running due South to the Chattahoochee River. The 2d was all to the West of the foregoing line, and East of a line beginning on the line of Tennessee, 27 miles West of 1st Section, and running due South to the southern Cherokee boundary in what is now Douglas County. The 3d was defined by a line commencing 27 miles further West and running due South to the southern Cherokee boundary in what is now Haralson County; and the 4th was the remainder of the Cherokee country between that line and the State of Alabama. The Act of December 15th, 1830, authorized its survey and distribution. The 4 Sections were divided into Land Districts 9 miles square, and the lots into 160 acres each, and distributed by Lottery of March, 1833 (except the Gold region, which was distributed by the next lottery).

*8th. The Gold Lottery.*—That portion of the Cherokee Purchase which was known or supposed to contain Gold, was divided into 40-acre lots under Act of December 24th, 1831, the drawing taking place in July, 1833. It consisted of the following Land Districts in then Cherokee County—viz.: In the 1st Section, Districts No. 1, 2, 3, 4, 5, 11, 12, 13, 14, and 15. In the 2d Section, Districts No. 1, 2, 3, 15, 16, 18, 19, and 21. In the 3d Section, Districts No. 1, 2, 3, 4, 17, 18, 19, 20,

and 21 ; and in the 4th Section, Districts No. 1, 2, 3, 16, and 17.

These several Lotteries are defined on the map accompanying this work by red lines, and are properly numbered.

#### BANKS.

In 1860 there were 25 Banks in Georgia, with an actual capital of \$9,028,078.

During the war, the Banks invested their funds in Confederate bonds and securities to a very large extent. One of the results of the war, therefore, was to make a clean sweep of the Banks—only two surviving the wreck. These were the Georgia Railroad and the Central Railroad Banks. Being connected with strong and wealthy corporations, whose *banking* capital constituted only a small portion of their entire capital, they survived.

At this time (1876), there are 37 banking institutions having State Charters. These have no circulation, and do only a discount and deposit business. The reports of their condition at this writing (November, 1876) have not been received, and can not be given.

There are in the State 12 National Banks, having, on October 1st, 1876, a Capital of \$2,334,540; Surplus, \$460,901; Circulation, \$1,803,753; Individual Deposits, \$1,653,150; Government Deposits, \$80,124; and their Loans and Discounts were \$2,719,204. For this information, we are indebted to the courtesy of Hon. John Jay Knox, Comptroller of the Currency, Washington, D. C.

#### THE RAILROADS AND CANALS OF GEORGIA.

The following pages contain a brief statement of the location, condition, etc., of all the railroads in Georgia; also the most prominent features of the history of railroad-making in the State. As before stated, there are about 2,400 miles of road within the State's limits, or about one mile of road to every 500 inhabitants. If uniformly distributed, an average county would have about 18 miles of road; the average distance of

every farm from a railroad would be 6 miles, and the greatest distance 12 miles.

**THE WESTERN AND ATLANTIC RAILROAD, OR STATE ROAD.**—This important line is wholly a State enterprise, built with money from the Treasury, and entirely owned by the State. It was undertaken by Act of December 21st, 1836, after a severe struggle and a greatly prolonged debate extending through several days—a thing then almost unprecedented in Georgia, in which a number of the first minds of the State participated. The “Railroad Fever,” if it may be so termed, was then at full heat.

The Georgia Railroad was chartered December 27th, 1831, as “The Augusta and Eatonton *Turnpike* and Railroad Co.,” to build a road from Augusta to Eatonton. In 1833, it was authorized to construct branches of the road to Eatonton, Madison, and Athens. In 1835, banking privileges were given the Company by an Act still further amending the Charter (the work of building the road being then in progress). A few extracts will show that our people then (as they do now) regarded a line of transportation through Georgia to its coast, the most practicable natural outlet for the surplus products of the West and North-west ; and for which the State road was finally built.

This amendment, and the privilege of carrying on a Banking business by the Georgia Railroad, were granted with the view of connecting the Athens branch thereof with a “railroad which the people of the West have in contemplation, to make a communication between the city of Cincinnati and the Southern Atlantic Coast;” and as the “best route for said communication is believed to be through the State of Georgia,” and the building “of the said Georgia Railroad is now in progress, and will be an important link in said connection ;” and this condition was annexed: “*provided* the continuation of said road beyond Athens, so as to connect with the Cincinnati road, shall be steadily prosecuted.”

The Central Railroad was chartered December 20th, 1833, as “The Central Railroad and Canal Company of Georgia,” authorizing the construction of a Railroad and Canal, or either, from Savannah to Macon. This charter was also amended in 1835, by granting banking privileges, the road being under construction at the time.

The people of Georgia were then in a more prosperous condition than they ever were before ; but notwithstanding money was abundant for all ordinary purposes, and the people comparatively free from debt, it was difficult to find enough persons having sufficient confidence in the success of new and untried enterprises to invest their money to the extent of several millions of dollars. The "Georgia" and the "Central" roads were making rather slow, though steady progress, not being rapidly pushed forward to completion.

The advantages of easy and rapid travel, and transportation of produce and merchandise, were well understood ; and a short cut to the great West, without going round by Philadelphia or New York or New Orleans, was a grand object at which the statesmen of Georgia aimed. Those who keenly felt the importance of this direct communication with the West, after carefully considering the subject, determined upon making it a State enterprise, and the matter was presented to the Georgia Legislature in 1836.

It was earnestly supported by William W. Gordon, Charles J. Jenkins, Andrew J. Miller, Edward Young Hill, Iverson L. Harris, and, last, but not least, Alexander H. Stephens, who closed the debate in the House. It was his first session in the Georgia Legislature, and his speech on this measure was his *début*—his first effort in that body.

The bill passed the House by a majority of only 3 votes. Its declared object was to establish "a Railroad communication as a State work, and with the funds of the State, to be made from some point on the Tennessee River, commencing at or near Rossville, in the most direct and practicable route, to some point on the south-eastern bank of the Chattahoochee River, which shall be the most eligible for the extension of branch roads thence to Athens, Madison, Milledgeville, Forsyth, and Columbus."

It was declared that said road "shall be known and distinguished as the Western and Atlantic Railroad of the State of Georgia," signifying that it was intended to connect the West with the Atlantic coast ; and the Act appropriated \$290,000 to be expended in the work during the year 1837. This was commenced this great State enterprise.

It was estimated at the time that it would cost \$4,500,000.

The means of ascertaining what it has cost the State are not attainable. The Comptroller-General in 1859 made an effort to do so, and found that \$4,441,532.15 had been appropriated from the State Treasury, besides large sums of its own earnings paid out for construction that never came into the State Treasury. A committee of the Legislature in 1865, after investigating the matter as far as convenient, reported it had cost \$7,849,224.68. Its cost is generally set down at \$8,000,000. During the year 1860, its net earnings paid into the State Treasury were \$450,000.

But like all property owned and operated by a State or any government, it has, a part of the time, been abused and mismanaged, and caused dissatisfaction and contention in the Legislature ; and the people have several times been exercised upon the question of what to do with the road. The panic and crash of 1840, followed by hard times, caused many to favor its sale and abandonment altogether as a State enterprise. This proposition was distinctly made in both Houses of the Legislature in 1843, and very nearly succeeded. The Senate passed resolutions by a majority of 14, declaring "that it is expedient and proper to sell and dispose of the Western and Atlantic Railroad," and specified the terms upon which the sale should be effected—one of which was that it should be sold for \$1,000,000, to be paid in annual instalments. A bill to continue the work was passed in the House by a majority of *one* only—which measure finally passed the Senate and became a law.

At that time, there had been expended \$2,916,008.28 ; the road had been finished and the cars were running 33 miles, beginning at Atlanta (then Marthasville) ; the cross-ties laid 52 miles from Marthasville ; the iron was ready to lay that distance ; and the grading its whole length was nearly complete. The Georgia Railroad was then finished and in operation from Augusta beyond Madison, more than 100 miles ; the Athens branch entirely finished and in operation, the work being energetically pushed to make the junction with the State Road at Marthasville, now Atlanta ; and the Monroe Railroad, now the Macon and Western, was being pressed to completion from Macon to Atlanta.

Thus narrowly was this enterprise saved to the State in the face of these prospects.

In compliance with an Act of the Legislature, the road and all of its property were leased to a Company for 20 years for \$300,000 per annum, in December, 1870 ; and this Company now have possession of and are operating it. The rental has been promptly paid at the end of every month. Its receipts for the year 1872 were \$1,590,245.37 ; and operating expenses, \$1,440,687.31. Ex-Governor Joseph E. Brown is President of the Company, and General William McRae Superintendent. The office of the Company is in Atlanta. The road has extensive eastern and western connections. Its length is 138 miles from Atlanta, Ga., to Chattanooga, Tenn.

THE GEORGIA RAILROAD.—This important road from Augusta to Atlanta, 170 miles long, with branches—1 from Barnett Station to Washington, 18 miles ; and 1 from Union Point to Athens, 39 miles—in all 228 miles—was the first road chartered in the State that was actually built—viz.: on December 27th, 1831, as the “Augusta and Eatonton Turnpike and Railroad Company.”

On December 21st, 1833, the charter was amended, by which the Company was authorized to construct a Railroad or *Turnpike road* from Augusta, with branches to Eatonton, Madison, and Athens ; and “if the Company herein specified should deem it profitable to construct common roads, and use *steam carriages thereon*, they shall have the power to do so.”

The charter was amended on December 18th, 1835. The preamble to this Act recites :

“*Whereas*, the people of the West have in contemplation to make a communication between the city of Cincinnati and the Southern Atlantic coast by means of a Railroad ; and,

“*Whereas*, the best route for said communication is believed to be through the State of Georgia ; and,

“*Whereas*, the building of the Georgia Railroad is now in progress, and will be an important link in said communication,” etc., etc., therefore banking privileges were granted the Company,

“*Provided*, however, that the continuation of said road beyond Athens so as to connect with the Cincinnati Road

shall be steadily prosecuted, so soon as the Company shall have satisfactory evidence that the said connection can be formed."

This connection was never made. The Legislature, at its next session in 1836, undertook to build the Western and Atlantic Railroad on the part of the State to form this very desirable connecting link; therefore that portion of the Georgia Railroad between Union Point and Athens became the "Athens Branch," and the main line was directed to the place where Atlanta now stands, to form a junction with this "connecting link."

Work was commenced on the Georgia Railroad early in 1835. It was finished to Crawfordville, July 1st, 1838; to Greensboro, May 10th, 1839; to Madison in 1841; to Covington in the Spring of 1845; and to Atlanta in September, 1845. The first passenger-train on this road reached Atlanta September 15th, 1845.

The branch of the road to Athens was completed in December, 1841; and the branch to Washington in 1854.

The road was prosperous from the first. J. Edgar Thomson, late President of the Pennsylvania Railroad, was the chief Engineer, and in its construction showed his great ability, and began the reputation which finally called him to the head of the greatest railroad corporation in America. In 1858, 13 years after the road and its branches were completed, it had a surplus of more than half a million of dollars.

Mr. Richard Peters, now of Atlanta, came from Philadelphia soon after Mr. Thomson, and was Locating Engineer, locating the road from Augusta to Greensboro, and was afterward the General Superintendent.

This road has a large interest in the "Nashville and Chattanooga Road" in Tennessee, and the road from Port Royal in South Carolina to Augusta, and by its connections greatly facilitates transportation and travel between St. Louis and the Atlantic coast, which is 235 miles shorter than from St. Louis to New York; and Port Royal is one of the best seaports on the continent. It can be entered at all times by the largest ships without a pilot. There is no expense, inconvenience or delay of drayage at Port Royal. All freights are transferred directly from the cars into the ships, and *vice versa*.

The Georgia also controls and operates the Macon and Augusta Railroad from Macon to Camak, 74 miles.

The cost of Building the Road is.....	\$4,253,048 40
Capital Stock.....	4,200,000 00
Funded Debt.....	615,500 00
Average Gross Receipts per annum.....	1,300,000 00
Average Operating Expenses.....	800,000 00
Annual Dividend.....	8 per cent.

Hon. John P. King is President. He has filled this office continuously since 1841. S. K. Johnson is Superintendent ; and Carlton Hillyer, Auditor. The principal office is at Augusta.

THE CENTRAL RAILROAD OF GEORGIA.—This important railway was built about the same time as that of the Georgia. It was chartered December 20th, 1833; work commenced November, 1836, and was completed to Macon, October, 13th, 1843, nearly 2 years before the Georgia was finished to Atlanta. It is a strong corporation, with extensive connections, and is one of the most important roads in the country.

Its length from Savannah to Macon is 192 miles. This was the original chartered line of road. It also built a branch from Gordon to Milledgeville, 17.25 miles. In 1872, the Macon and Western Railroad, from Macon to Atlanta, 103 miles, including the branch from Barnesville to Thomaston, 16.5 miles, was consolidated with the Central. During the present year (1876), the Savannah, Griffin, and North Alabama Railroad, from Griffin, on the Macon and Western, to Carrollton, Carroll County, 59.29 miles long, has become the property of the Central, thus making a total length of 388.29 miles actually owned by the Company.

In 1852, it leased the road from Milledgeville to Eatonton, 22 miles, and operates and controls it, virtually making a branch of the Central from Gordon, *via* Milledgeville to Eatonton, 39.25 miles.

In 1862, it leased the Augusta and Savannah Railroad, from Augusta to Millen, on the Central Road, 53 miles, which it controls and operates.

In 1871, it leased the South-western Railroad and branches as follows : Main line, Macon to Albany, 104 miles ; Branch,

Fort Valley to Columbus, 71 miles ; Branch, Fort Valley to Perry, 11 miles ; Branch, Smithville to Eufaula, Ala., 61 miles ; Branch, Cuthbert to Fort Gaines, 22 miles ; Branch, Albany to Arlington, 37 miles : making a total of 306 miles.

It also leased the Vicksburg and Clayton Road from Eufaula, Ala., to Clayton, Ala., 21 miles. It also owns a half interest in the Western Railroad of Alabama, from West Point, Ga., to Selma, Ala., 138 miles, with branch from Columbus, Ga., to Opelika, Ala., 28 miles, or 166 miles in all. This road is owned jointly by the Central and the Georgia, obtained by joint purchase at public sale, in April, 1875.

It has also leased the Mobile and Girard Railroad, from Columbus, Ala., to Troy, Ala., 84 miles. It also owns a steamer on the Tombigbee River, plying between Columbus, Mississippi, and Demopolis, Ala.

It also owns a line of steamers on the Chattahoochee River, plying between Columbus, Ga., and Appalachicola, Fla. These boats are worth \$97,000.

It also owns 6 steamships plying between New York and Savannah, involving a capital of \$800,000.

The income of the road for the year ending September 1st, 1876, was \$2,657,096.97, and its operating expenses, \$1,635,131.10.

Its President is Wm. M. Wadley, and Superintendent Wm. Rogers ; principal office in Savannah. The principal office of the New York Steamship Line is in New York, Wm. R. Garretson being the Agent.

The Capital Stock of the Central Railroad Company is \$7,500,000 ; its Bonded Indebtedness, \$3,772,000.

**THE ATLANTA AND WEST POINT RAILROAD.**—From Atlanta to West Point on the Alabama line, connecting with the roads to Montgomery, Mobile, and New Orleans, 86.74 miles long. It was chartered and work commenced in 1851, and completed to West Point in 1857. Its cost was \$1,200,129 ; Capital Stock, \$1,232,200 ; Bonded Debt, \$27,000 ; average gross earnings per annum, \$407,000 ; and operating expenses, \$304,000. Its dividends are 8 per cent per annum. Hon. John P. King, President of the Georgia Railroad, is also President of this Company, the Georgia Railroad owning a considerable share

of the stock. L. P. Grant is Superintendent, and W. P. Orme, Treasurer. Its office is in Atlanta.

**THE MACON AND WESTERN RAILROAD.**—This road was chartered in 1833 as the Monroe Railroad Company, to run from Macon to Forsyth, in Monroe County.

It was afterward extended to Atlanta, and its name changed to that of the "Macon and Western." It is 102.5 miles long, with branch from Barnesville to Thomaston in Upson County, 16.5 miles, 119 miles in all. Bordering on the line of this road is the most populous part of Georgia. Its Cost and Capital is \$2,500,000 ; Funded Debt, \$150,000.

In 1871, it was leased by the Central Railroad, and in 1872 was consolidated with that Company.

**THE SOUTH-WESTERN RAILROAD.**—This important road, with its several branches, extends from Macon through Southwest Georgia to Columbus, Perry, Albany, Arlington, Cuthbert, and Fort Gaines in Georgia, and Eufaula in Alabama ; in all, 306 miles long. It was chartered December, 1845 ; work commenced in 1847, and completed to Oglethorpe, 50 miles, July 4th, 1851 ; since which, extensions and branches have been made from time to time. The branch from Albany to Blakely is now under way, being finished to Arlington. The Capital Stock of the road is \$4,587,313. In 1871, the entire road, with its equipments, was leased to the Central for a long term of years. For further particulars, see Central Railroad.

**THE MACON AND AUGUSTA RAILROAD.**—This road extends from Macon, through Milledgeville, to Camak on the Georgia Railroad, 74 miles. It was chartered, and work commenced before the late war, which suspended operations with only a small portion of the track graded. It was completed March 30th, 1871. Its cost was \$2,678,717.09 ; Capital Stock, \$1,971,741 ; Bonded Debt, \$770,000 ; average gross receipts per annum, \$110,000 ; and average operating expenses, \$100,000. It is controlled and operated by the Georgia Railroad.

**THE ATLANTIC AND GULF RAILROAD.**—The main line of this road is from Savannah to Bainbridge, 237 miles, with branches from Lawton, Ga., to Live Oak, Fla., 48 miles, and from Thomasville to Albany, 60 miles—345 miles in all. It is a consolidation of several roads. The oldest charter was

granted in December, 1847, and the road was completed in 1868. Cost, \$7,592,283 ; Capital, \$3,693,200 ; Bonded Debt, \$4,081,177 ; average gross earnings per annum, \$922,000 ; and operating expenses, \$624,000. Colonel John Screven is President ; office at Savannah.

**MACON AND BRUNSWICK RAILROAD.**—This line is from Brunswick to Macon, 187.5 miles, with a branch from Cochran's Depot to Hawkinsville, 10 miles : total, 197.5 miles. Its cost was \$7,250,000 ; Capital Stock, \$3,500,000 ; Bonded Debt, \$3,750,000. It was chartered, and 50 miles constructed before the war. The Legislature in 1866 authorized the Governor to endorse its bonds to the extent of \$10,000 per mile of finished road, by which endorsements were made to the amount of \$1,900,000. In 1870 a further endorsement of \$600,000 was authorized and made, but a subsequent Legislature repudiated it because it was illegally made. The road defaulted in payment of interest upon the endorsed bonds, was seized by the Governor in July, 1873, and sold in June, 1875, the State becoming the purchaser at the price of \$1,000,000 ; and it is now owned and operated by the State.

Its average gross earnings are \$324,528 per annum, and operating expenses, \$282,063. It is located through a sparsely populated country, and the port of Brunswick is not a place of large trade. Its cost was nearly \$37,000 per mile, making a debt and capital upon which no road through that section can pay interest. Its cost to the State is \$9,645 per mile, upon which it pays well. It is well equipped, and the road and rolling stock are kept in fine condition.

The State has provided for its private sale by Commissioners, appointed for that purpose. Dr. E. A. Flewellen is the Manager ; the office is in Macon.

**THE BRUNSWICK AND ALBANY RAILROAD.**—This road extends from Brunswick to Albany, 172 miles. It was chartered, a considerable portion of the grading done, and some of the track laid, previous to the war.

After the war, very heavy State endorsements (to the amount of \$23,000 per mile) of its bonds were procured, and the work commenced anew. It was projected to go to Eufaula, Ala., completed to Albany, and most of the grading done for the entire length of the road.

Its Capital is \$4,898,000, and Funded Debt \$5,980,000, thus costing more than \$63,000 per mile. It was built very largely with the proceeds of the sale of the bonds, which were endorsed by Governor Rufus B. Bullock. It was afterward proved that the endorsements were all made in plain violation of the law authorizing the same, and the bonds were repudiated by the State. It defaulted in paying interest, was seized and sold, and was purchased by the foreign holders of the bonds, mostly residents of Germany, and now operated by them.

Mr. Charles L. Schlatter is the Superintendent ; his office is at Brunswick.

**THE CHEROKEE RAILROAD.**—This road was chartered in 1866, to run West from Cartersville on the W. & A. R.R. to Pryor, Ala., on the S. R. & D. R.R., 45 miles, as the Cartersville and Van Wert Railroad. In 1869, the Legislature authorized the endorsement of the bonds of the Company to the extent of \$12,500 per mile, and changed its name. It was completed to Taylorsville, 15 miles ; and from there to Rockmart a narrow-gauge track of 8 miles was laid, and thus it has been operated for several years.

The endorsed bonds being issued in violation of the law were repudiated by the State, and parties at interest are contending in the courts for their several claims. It is in regular operation, and pays expenses and repairs. Its terminus is very near the great slate quarries of Polk County. Dr. S. F. Stephens, of Cartersville, is the Receiver and Superintendent:

**NORTH AND SOUTH RAILROAD.**—This road was chartered to run from Columbus *via* La Grange to Rome, 135 miles, in October, 1870, and organized to build a narrow-gauge road, the State agreeing to endorse its bonds to the amount of \$12,000 per mile.

The first 20 miles were completed from Columbus to Kingston, in Harris County, January, 1873, and 40 miles more graded. The State endorsed its bonds to the amount of \$240,000, on which it failed to pay the interest ; and it was seized by the State April, 1874, and is still held and operated by it. The average gross receipts are \$11,535.39 per annum, and average operating expenses \$9,825.05 per annum. Its authorized capital was \$5,000,000, of which \$386,319.14 was paid

in, and it had a floating debt of some \$200,000 before its failure. This first attempt to construct a narrow-gauge road in the State has, so far, resulted unfavorably. Dr. E. A. Flew-ellen is Receiver, whose office is in Macon.

**THE NORTH-EASTERN RAILROAD OF GEORGIA.**—This road is projected from Athens, Ga., through Rabun Gap to Knoxville, Tenn. It is completed and equipped from Athens to Lulu on the Atlanta and Richmond Air-Line Railroad, 40 miles. Work was commenced on it September, 1872, and completed to Lulu in September, 1876. Its President is A. K. Childs, and Superintendent James M. Edwards, the office being in Athens. The Company intend continuing the work next season.

**THE ATLANTA AND RICHMOND AIR-LINE RAILROAD.**—This road was chartered in 1857, surveys made, and a very small amount of grading done before the late war, but nothing further till 1868, when work was resumed, and the road completed to Charlotte, N. C., in 1873. Length, 265 miles—100 miles of which is in Georgia. It passes, much of the way, through a region which was previously cut off from railroad facilities.

It considerably shortens the length of the line from New York to New Orleans. Its Bonded Indebtedness is \$6,868,000, and Capital Stock \$7,500,000. It failed to pay the interest on its bonds, passed into the hands of a receiver, and is to be sold December 5th, 1876. Its office is in Atlanta. John H. Fisher, Receiver, and John B. Peck, Master of Transportation. It has only a limited supply of rolling-stock of its own, and has been operated by hiring cars, engines, etc., from other roads. Its earnings have been from \$65,000 to \$80,000 per month, and operating expenses \$43,000 to \$50,000 per month, including the hire of rolling-stock and repairs of the road.

**THE SELMA, ROME, AND DALTON RAILROAD.**—This road extends from Dalton, Ga., to Selma, Ala., 237 miles, only 75 or 80 miles being in Georgia.

It passes through one of the richest sections of the State. Its office is in Selma, Ala.

**THE ROME RAILROAD.**—This road is from Kingston, on the Western and Atlantic Railroad, to Rome, 20 miles, passing

along the Etowah Valley, a rich and highly productive section. Its Capital Stock is \$250,843. It is economically managed, pays good dividends, and is out of debt. The office of the Company is at Rome. C. M. Pennington, Superintendent.

**THE ELBERTON AIR-LINE RAILROAD.**—This line is 51 miles long, from Toccoa City on the Atlanta and Richmond Air-Line Railroad to Elberton, in Elbert County. It is graded and the cross-ties ready, but the iron, track-laying, and equipments are yet to be supplied. It has no State endorsement, and does not owe any thing, all the work thus far done being paid for in full. Efforts are being made to have it equipped during the coming season. It passes through a productive and wealthy portion of the State.

Savannah is the leading distributing centre of supplies from the East, and the leading point for exports ; Atlanta the centre of supplies from the West, such as stock and provisions, etc., and is a great inland distributing point.

And thus it appears that the activity and enterprise excited by Governor Troup's schemes of internal improvement by a system of canals, were transferred to the new mode of transportation by rail.

A liberal policy toward the agricultural interests has been pursued by all the railroads in the State in giving low rates on fertilizers, and a wise liberality in the free passage of delegates to the semi-annual conventions of the State Agricultural Society, an institution which greatly contributes to the intelligent industry of farmers, and, by thus aiding production, increases transportation.

**THE AUGUSTA CANAL.**—This is a great work performed by the city of Augusta for the purpose of affording sufficient facilities for making it a prominent manufacturing point, especially of cotton.

The city is a great inland cotton mart, has 21,000 inhabitants, and real and personal estate to the amount of \$20,000,000.

A few public-spirited citizens projected it. Among them Hon. John P. King, Colonel H. H. Cumming, and Wm. M. D'Autignac. A canal was commenced in 1845, and completed in 1847, having 40 feet surface width, 20 feet bottom, and 5

feet depth, with a total mechanical effect of about 600 horse-power. It was soon found to be entirely too small to supply the demand, and in process of time its enlargement was determined upon.

Work for this purpose was commenced in March, 1872, and the enlarged canal completed July, 1875.

It is 9 miles long, drawing an inexhaustible supply of water from the Savannah River. It is 150 feet wide at the top, 106 feet wide at the bottom, and 11 feet depth of water. Its mechanical minimum is 14,000 horse-power. It is available in different localities for water-power from 13 to 40 feet fall.

The plan of the city is to lease this power to manufacturers of any kind who desire to use it. A number of enterprises are already located and at work upon it, such as Cotton and Flour Mills, Fertilizer Manufactory, Machine Works, etc. It is one of the most convenient manufacturing sites in the whole South, furnishing unsurpassed facilities for water-power and convenience of transportation.

**THE SAVANNAH AND OGECHEE CANAL.**—This was the first work of internal improvement, or of any inland transportation, constructed in Georgia.

On December 20th, 1824, the Legislature authorized its construction, and work was soon commenced, but did not progress rapidly. After 4 years, in December, 1828, the Legislature passed an Act reciting, that "Georgia is deeply interested in carrying into effect every enterprise having for its object internal improvement and giving facility to the commerce and transportation of the products of the different counties in this State;" and "whereas the laudable efforts made for this purpose by the Savannah, Ogechee, and Altamaha Canal Company, are likely, as appears by their memorial, to prove abortive; . . . and whereas the interest and honor of the State demand that this first attempt at internal improvement should not fail for want of means to carry it on"—therefore, the Governor was authorized to subscribe \$44,000 to the stock of the Company. It was finished to the Ogechee River, 16 miles, and is still in operation. It is paying property and very useful to the city of Savannah.

## PUBLIC SCHOOL SYSTEM OF GEORGIA.

Georgia has, from her earliest history, as her records will show, been alive to the importance of educating the children of the State, and has always (previous to the late war) made every necessary provision for this purpose.

For many years there were no public schools or free education to all. It was not needed. Nearly all of our people were fully able and willing to educate their children, and did so; and the Legislature made provision for paying for the tuition of all who were not thus able, and did so regularly and promptly, to the satisfaction of the public.

The fund out of which this was paid was derived from dividends on stock, which the State owned in a number of the banks in Georgia. The war swept away the banks, and thus the entire source of this income was utterly lost.

Our people, before the war, were beginning to feel the need of and were looking to the establishment of public or free schools, and had taken the first steps in that direction. On December 11th, 1858, the Legislature set apart \$100,000 annually of the net earnings of the Western and Atlantic Railroad (State property) for educational purposes. It also provided that when any portion of the public debt of the State was paid, bonds of the State of a like amount as those taken up should be executed by the Governor and deposited with the Secretary of State, who should hold them as Trustee of the Educational Fund, the interest thereon at 6 per cent to be appropriated to school purposes.

These measures contemplated at no distant day a fund sufficient to establish free schools throughout the State; and it would undoubtedly have so resulted long since, but for the war. The provisions of the law went so far as to allow the people of any County to establish free schools and use its share of the funds for this purpose; and in 1860 in one county (Forsyth), free schools were established and successfully carried on.

The Constitution of 1868 (the present Constitution) requires that "the General Assembly, at its first session after the adoption of this Constitution, shall provide a thorough system

of general education to be forever free to all the children of the State." For an Educational Fund, it sets apart the poll tax, a special tax on shows and exhibitions and the sale of spirituous and malt liquors, and the proceeds from the commutation for military service; "and if these sources prove insufficient, the General Assembly shall have power to levy such general tax upon the property of the State as may be necessary; and there shall be established as soon as practicable one or more schools in each school district in the State." Such are the provisions of the Constitution.

Although the State Government, including the Legislature, was in the hands of that class of men who made the present Constitution with the foregoing provisions, the Legislature did not "at its first session," provide for the thorough system of free education as the Constitution required. It was not till October 13th, 1870, that a school law was enacted. This Act established a State Board of Education, to be composed of the Governor, the Attorney-General, the Secretary of State, Comptroller-General, and State School Commissioner. It required the Trustees of schools in their respective districts to make all necessary arrangements for the instruction of all the youth of the district—the Whites and Blacks to be in separate schools. They were to provide the same facilities for each; "but the children of the white and colored races shall not be taught together."

It provided as an Educational Fund, in addition to the items named in the Constitution, one half the net earnings of the Western and Atlantic Railroad, and required the State Board of Education to ascertain and report annually what amount in addition to the foregoing, should be raised annually by taxation.

The year following (1871) the State School Commissioner proceeded to establish public schools in the State.

During this time the taxes arising from polls, shows, etc., was paid into the State Treasury. On October 1st, 1871, the fund from this source alone amounted to \$327,083.09.

The Legislature, on July 28th, appropriated this money to other purposes, and caused bonds of the State to be deposited with the State Treasurer in lieu thereof, which were to be sold, and the proceeds of their sale to be used to meet ap-

propriations for school purposes. These bonds proved to be of a worthless issue, which had, for some time, been on the market for sale, but could not be sold, because they were known to have been illegally issued. Thus this fund was lost to the cause of education.

In January, 1872, the present State School Commissioner, Hon. Gustavus J. Orr, was inducted into his office under these embarrassing circumstances. He could not establish any schools that year, for the means were wanting ; but in 1873, funds sufficient had accumulated to establish schools for three months, and the same has been done every year since.

In 1875, the attendance was 169,916, of which 114,648 were white and 55,268 black. The School Fund for 1875 was \$291,319. The Fund for 1876 is about the same.

The school population for 1875 was 394,037—of whom 218,733 were white and 175,304 black.

The present sources of the School Fund, under existing law, are :

1. All Poll Tax. This, for the year 1875, if all collected, would have amounted to \$199,550 ; but there was collected only about \$130,000.

2. Tax on Shows, Exhibitions, etc. This for 1874 was \$2,069.50 ; for 1875, \$3,139.91. (No tax has yet been levied upon the sale of liquors.)

3. One half the net earnings of the Western and Atlantic Railroad. This, at present, is \$150,000 per annum.

The Constitution authorizes a general tax upon all the property of the State, to make up a sufficient fund. This has not yet been done.

The present law requires that when any school fund is received, from whatever source derived, "it shall be kept separate and distinct from other funds," and be "used for educational purposes and none other, and shall not be invested in bonds of the State or in any other stock."

There are public schools established under local laws in 7 counties, embracing the cities of Savannah, Atlanta, Augusta, Macon, Columbus, Griffin, and Brunswick, which are kept up continuously. In these there are 68 ungraded schools, 70 graded, and 9 high schools. There were in 1875 admitted to these schools, whites—males, 4,330 ; females, 4,428 : blacks—

males, 3,324; females, 3,633. The average monthly cost of tuition per scholar in these schools was \$1.23.

In Georgia, in 1875, there were 820 *private* elementary schools, having the following attendance: whites—males, 11,186; females, 10,089; blacks—males, 2,118; females, 2,058. Total whites, 21,275; blacks, 4,176. The average monthly cost per scholar of tuition in these schools was \$1.88.

In 1875 there were 104 private high schools, having 171 tutors and 5,379 pupils; of which 3,087 were males and 2,292 females—all white. The average monthly cost of tuition per scholar in these was \$3.13.

#### UNIVERSITIES AND COLLEGES.

A short history and statement of the condition of some of the Colleges of the State are here given. These are not only interesting, but show what Georgia has done and is doing for the higher education of her youth—male and female—white and black.

UNIVERSITY OF GEORGIA.—On July 8th, 1783, the Legislature of Georgia assembled in Augusta. The Governor, Hon. Lyman Hall, in his message on that occasion, said:

“In addition, therefore, to wholesome laws restraining vice, every encouragement ought to be given to introduce religion and learned clergy to perform divine worship in honor to God, and to cultivate principles of religion and virtue among our citizens. For this purpose, it will be your wisdom to lay an early foundation for endowing seminaries of learning; nor can you, I conceive, lay in a better than by a grant of a sufficient tract of land that may, as in other governments, hereafter, by lease or otherwise, raise a revenue sufficient to support such valuable institutions.”

This idea or suggestion of granting land to endow “such valuable institutions” was the germ from which the University of Georgia was developed. This was less than three months after the close of the Revolutionary War.

Early the next year—1784—the Legislature assembled in Savannah, and on February 25th, less than one year after the war, passed an Act to lay out 2 new counties, to be called “Washington” and “Franklin,” and required the County Surveyors thereof to lay off 20,000 acres in each of these counties

in 5,000 acre tracts, or 40,000 acres in all, "for the endowment of a college or seminary of learning," said land to be of the first quality, and to be exempt from taxation.

On January 27th, 1785, the Legislature at Savannah passed an Act "by the Representatives of the Freemen of the State of Georgia in General Assembly met, and by the authority of the same, . . . for the more full and complete establishment of a public seat of learning in this State." The preamble recites that a free government can "only be happy where the public principles and opinions are properly directed;" that among the "first objects" should be to "encourage and support the principles of religion and morality, and early to place the youth under the forming hand of society, that by instruction they may be moulded to the love of virtue and good order." They therefore enacted that the "general superintendence" of the "public seat of learning" be "committed and entrusted to a Board of Visitors and a Board of Trustees, which two Boards united . . . shall compose the *Senatus Academicus* of the University of Georgia."

All the officers of the University were required to be "of the Christian religion," and to "publicly take the oath of allegiance and fidelity;" and the Trustees were prohibited from "excluding any person of any religious denomination whatever from the free and equal liberty and advantages of education, . . . and that no one shall be excluded from any of the privileges and immunities of the University on account of his sentiments in religion or being of a different religious profession."

On the 11th day of March following, it was "ordered that the Secretary of State do immediately make out 8 warrants for the same—that is to say, 4 for 5,000 acres each in Franklin County, and 4 for 5,000 acres each in Washington County," thus setting apart the 40,000 acres to found and endow a State University.

On February 3d, 1786, an Act was passed by the Legislature at Augusta, for laying out Greene County within the limits of Franklin County, and including a portion of the University land. It authorized the Trustees to lay out the town of Greensboro and sell off lots, the proceeds to be applied to the University, the intention being to locate it at that place;

but it did not meet with entire favor. The lands were sold as opportunity offered, and the money invested, and in June, 1801, the funds were sufficient to pay a President of the University. Josiah Meigs was chosen, and at once entered upon the duties of his position, though no building had been erected and the site not even fixed.

In November, 1801, a committee of the Trustees appointed for the purpose reported the selection of the site where the college now stands; Hon. John Milledge had conveyed to them 700 acres of land, on which the town of Athens is principally located, which were sold off in lots for the benefit of the college. The site was then on the Western borders of civilization, but results show that the selection was a wise one.

The first commencement exercises took place in May, 1804, upon the campus, under an arbor formed of the branches of trees. Here the first class, 10 in number, graduated, the scene being witnessed by some friends of the Institution, and a number of spectators.

The University lands were sold largely for notes secured by mortgage on the land; but by authority of an Act of December 16th, 1815, the Legislature took all these notes as a consideration for \$100,000, and bound the State to pay the University perpetually an annuity of \$8,000—interest at 8 per cent on this endowment, which has been continued till this time. Thus was the University, through much patient labor, perseverance, and devotion to the great end in view, established.

Rt. Rev. Wm. Bacon Stevens, Protestant Episcopal Bishop of Pennsylvania, justly remarks that Georgia, the last settled and the feeblest of the original 13, exposed by an extensive frontier to the incursions of Indians, French, and Spaniards, and—

“Looking upon the broad scope on which the University was planned, the sound principles on which it was based, the zealous efforts of its founders to make it stable and efficient, we must say that Georgia merits peculiar honor in being among the first of the States to make provision for a State University, and in passing most wholesome laws for securing to her sons the blessing of a liberal education on her own soil.”

Its presiding officers have been: Josiah Meigs, LL.D., President, 1801 to 1811; John Brown, D.D., President, 1811 to 1816; Robert Finley, D.D., President, 1816 to 1817; Moses

Waddell, D.D., President, 1819 to 1829; Alonzo Church, D.D., President, 1829 to 1859; Andrew A. Lipscomb, D.D., LL.D., Chancellor, 1860 to 1874; Henry H. Tucker, D.D., Chancellor, 1874 to the present.

It has now 5 Departments, 13 professors, and over 200 students. These are exclusive of the Medical Department of the college, which is at Augusta, having over 60, and the North Georgia Agricultural College at Dahlonega, with nearly 250 students. In the latter, tuition is entirely free.

The college proper at Athens admits "50 meritorious young men of limited means" to the college course without payment of tuition fees; also young men who design to enter the ministry of any denomination whatever, provided they are in need of this aid to complete their education. A number of the most eminent men of the country were educated at this Institution, which is justly ranked among the best in the country.

The total value of property of the University is \$228,000. The college has over 13,000 volumes in its Library; also the Gilmer Library, containing about 1000 volumes of valuable books, bequeathed by Hon. George R. Gilmer—for 4 years Governor of the State, and a very ardent friend of the University. The two college societies also have fine libraries, containing over 3000 volumes each.

The endowment of the University is \$128,350, besides the special endowment of the State College of Agriculture and the Mechanic Arts, which has an endowment derived from the sale of the Agriculture Land Scrip donated to the State by Congress, of \$242,202.17, making the total endowment of the University \$370,552.17.

The State College of Agriculture and the Mechanic Arts has provided for educating as many young men, residents of the State, as there are members of the Georgia Legislature (both Senators and Representatives), free of charge for tuition fees. Each student before entering this College must have a fair knowledge of English Grammar, Arithmetic, and Geography. There are three Departments of study—viz.: Agriculture, Engineering, and Applied Chemistry. Each of these Departments has its regular course.

There is also a Law School at Athens connected with the University.

**MERCER UNIVERSITY.**—In 1828, Josiah Penfield, a Deacon of the Baptist Church in Savannah, left a bequest of \$2,500 to the Baptist Convention of the State of Georgia, provided that body would add to it a like sum, to establish a literary and theological institution in Georgia. This was announced to the Convention at its session at Milledgeville in March, 1829, and several prominent members at once contributed and raised over \$3,000 to secure this legacy.

In 1832, the site for the school was selected in Greene County, and named "Penfield," in honor of the donor of the \$2,500; and in 1833 the school was opened as a manual-labor school, by the name of Mercer Institute, in honor of Rev. Jesse Mercer, with Rev. B. M. Sanders as Principal, and Rev. John F. Hillyer, now of Texas, and Mr. I. O. McDaniel, now of Bartow County, Ga., as assistants. The school began with 100 young men as students and an endowment of nearly \$6,000. This was the beginning of Mercer University.

A charter was obtained from the Legislature, December 29th, 1836, to establish a college for the Baptist Denomination, at Washington, Ga. After due consideration, it was deemed best to concentrate the funds and efforts of the friends of education in the Baptist Church, and to raise Mercer Institute into a University; and this policy was adopted. The college was opened in 1838. The manual-labor feature was continued till 1842. The first class, consisting of 3, graduated in 1841.

By direction of the Convention in 1870, the University was removed to Macon, as a more eligible locality, where they have erected what is regarded as one of the finest college buildings south of the Potomac. The present building and the grounds (10 acres) cost \$150,000. Two other large buildings are yet to be constructed. The University has an endowment of \$160,000. Its Library consists of over 6,000 volumes. The Ciceronian and Phi Delta Societies each have Libraries, amounting in all to about the same number of volumes. Rev. A. J. Battle, D.D., is President.

Since the beginning of the College course in 1838 till the present, 390 have graduated. The number of students at present is about 135.

It has 9 Professors. Besides the regular College course, it has a Law and Theological School at Macon. Connected with the University are Mercer High School at Penfield, occupying

the former buildings and property of the University at that place, and has 120 students; and Crawford High School, recently established at Dalton, having 125 students—both for the purpose of more readily preparing young men for the college. These are schools of high order.

Rev. Jesse Mercer, in whose honor the University was named, was not only a leading man and a minister of his denomination, but a highly talented, greatly respected, and influential citizen. But few such men exist in any single age in any country. He was born in Halifax, N. C., in 1769, and brought to Wilkes County, Ga., by his father when a child. He commenced preaching before he was 20 years old, and continued his ministry for over 50 years. He died September 6th, 1841.

EMORY COLLEGE.—This College, located at Oxford, in Newton County, 40 miles east of Atlanta, was chartered December 29th, 1836. From the first, it belonged to the Methodist Church, and is now the joint property of the North Georgia, South Georgia, and Florida Conferences.

The first class of 3 graduated in 1841. It has up to this time graduated 590, a very considerable number of whom are prominent in Church and State. It has now 156 students. The President is Rev. Atticus G. Haygood, D.D. It has a valuable college apparatus, and several thousand volumes in its Library.

The Literary Societies have large and valuable libraries.

PIO NONO COLLEGE.—This is a Catholic College, located in Macon, and established mainly through the efforts of Right Rev. William H. Gross, Bishop of Savannah, since his consecration in 1873. He very soon determined to erect a college within his diocese, and was cordially aided by the denomination and by many who were not Catholics. The present college edifice was commenced May, 1874, and completed, ready for occupation, in October following—a handsome brick costing \$50,000. It has a regular college curriculum, classical and scientific courses, and a theological course, and employs 10 professors and tutors. Rev. C. P. Gaboury is President. It bids fair to take high rank among the institutions of learning in Georgia. Last term (ending June, 1876) it had 86 students.

THE ATLANTA UNIVERSITY.—This is a school located in Atlanta for the higher education of Negroes in Georgia and

adjoining States. It was established by the Freedmen's Bureau and various Northern Aid Societies, the most prominent being the American Missionary Association.

The Charter was obtained in October, 1867, and about 50 acres of land purchased on the western border of the city. The building was commenced June, 1869, and in August, 1870, two large buildings were completed. The whole property (including 60 acres of land) is worth about \$100,000. Another building is contemplated to supply chapel, library, laboratory, etc.

The first building (begun in June, 1869) was occupied as a school in October following. The first year—1869-70—there were 89 pupils; and the present year—1875-6—240, 21 of whom are in the College course, 29 in the Preparatory course, 113 in the Normal course, 68 in the Higher Normal course, and a few in Scientific courses; and 6 graduated from the College course with the degree of B.A., and one with the degree of B.S.

The Institution has a Library of 3,000 volumes, and a Library endowment of \$5,000, the interest of which is used yearly to add to the Library. Besides this, it has no other endowment.

Its support is derived entirely from tuition fees, from contributions by the American Missionary Association, from the Peabody School Fund, and from \$8,000 per annum donated to it by the Legislature of the State of Georgia. It aids from 40 to 50 pupils either partly or wholly according to circumstances.

It has a President, 3 Professors, and 11 Instructors in various branches. Rev. Edmund A. Ware is President.

**WESLEYAN FEMALE COLLEGE.**—Georgia claims the honor (and it is no doubt due) of establishing the first Female College in the world, for the higher education of women and conferring degrees upon its graduates; and this honor is specially due to the Methodists of Georgia. It is a denominational Institution, conceived and founded mainly by the efforts of leading ministers of that Church for the purpose named. It was not, at first, the *property* of the Church, though it was chiefly indebted to prominent Methodists for its inception and establishment.

The College is beautifully located and well supplied with all necessary buildings and apparatus, at Macon, and many of the prime movers were citizens of that place. It was chartered December 10th, 1836.

The charter authorized the President, by and with the consent of the Trustees, to confer all such honors, degrees, and licenses as are usually conferred in colleges and universities.

The College was built by general subscription—Methodist ministers acting as agents for the collection of funds, by appointment of the Bishops at the Conferences, and thus had a denominational cast from the first.

In 1845, James A. Everett, of Houston County, paid off a mortgage of \$10,000 against the College, and presented it to the Georgia Conference of the Methodist Episcopal Church, South. From this time, it became the sole property of the Georgia Conference, and is now the joint property of the North and South Georgia Conferences.

The first class of 11 graduated in 1840, and a number have graduated every year since that time. The degree of A.B. has been conferred on 678, and of A.M. on 402 of its graduates, besides some honorary degrees. This year—1876—there are 40 students in the Senior Class, 54 in the Junior, 55 in the Sophomore, and 55 in the Preparatory Classes. It has a President—Rev. W. C. Bass—and 7 Professors, besides Teachers and Assistants, and is a justly popular institution.

**SOUTHERN MASONIC FEMALE COLLEGE.**—This institution is located in the town of Covington, Newton County, on the Georgia Railroad. It was first erected by the people of the place for a female school of high order, in 1851, and called the Southern Female College. In 1852, it was transferred to the Grand Lodge of the Masonic Fraternity in Georgia, a new charter obtained, and its name changed. The Grand Lodge of the State appoints the Board of Trustees, of which the Grand Master is President. It is the sole property of the Order, and was procured for the purpose of educating the female orphans of Masons. It has a collegiate curriculum, and confers a full Baccalaureate degree upon its graduates. It has an average attendance of 90, and has graduated over 350 up to this time. It is largely patronized outside of the beneficiaries of the fraternity. Rev. J. N. Bradshaw has been its President for a number of years.

REPORT OF COLLEGES IN THE STATE, TAKEN FROM THE ANNUAL REPORT OF THE STATE SCHOOL COMMISSIONERS  
FOR 1875, AND OTHER SOURCES.

LOCATION.	NAME.	NAME OF PRESID- ING OFFICER.	No. of Pro- fessors.	No. of Students.	BRANCHES TAUGHT.	Average cost of tui- tion per month for each student.
Athens.....	University of Georgia.....	H. H. Tucker.....	17	229	Usually taught in Universities.....	\$7 50
Macon.....	Mercer University.....	A. J. Battle.....	6	150	Usually taught in Colleges.....	6 66
Macon..	Wesleyan Female College..	W. C. Bass.....	11	193	College Curriculum.....	8 00
Macon.....	Pio Nono College.....	C. P. Gaboury.....	10	86	".....	2 25
Rome.....	Rome Female College.....	J. M. M. Caldwell,	6	114	Usually taught in Colleges.....	4 00
Rome.....	Cherokee Baptist Female College.	L. R. Gwaltney.....	6	123	Usual branches.....	4 00
Perry.....	Houston Female College.....	George R. Briggs...	1	44	Classics, Mathematics, and Sciences.....	4 00
Jefferson.....	Martin Institute.....	John W. Glenn.....	4	118	Usually taught in Colleges.....	3 25
Dahlonega.....	North Ga. Agricultural College...	D. W. Lewis.....	5	243	Elementary Academic and Collegiate Branches.	1 00*
Oxford.....	Emory College.....	A. G. Haygood.....	8	152	College Course.....	6 00
Covington.....	So. Masonic Female College.....	J. N. Bradshaw.....	6	101	Usually taught in Colleges.....	4 50
Conyers.....	Conyers Female College.....	R. A. Guinn.....	4	115	".....	2 50
Talbotton.....	Levern Female College.....	William Park.....	2	35	Elementary Languages, Natural and Moral Science...	....
Thomasville.....	So. Female College.....	I. F. Cox.....	4	105	Usually taught in Colleges.....	4 25
La Grange.....	La Grange Female College.....	J. T. Johnson.....	6	101	Usual Branches.....	5 00
La Grange.....	West Point Female College.....	A. P. Mooty.....	5	54	Introductory and Collegiate.....	4 66
West Point.....	Dalton Female College.....	W. A. Rogers.....	7	53	Usual Branches.....	2 00 to 6 00
Dalton.....			116	100	Usual in Colleges.....	....
				2,116		Aver. \$4 71

\* Tuition in this Institution free, except some incidental expenses.

## BENEVOLENT AND CHARITABLE INSTITUTIONS.

THE GEORGIA ACADEMY FOR THE BLIND.—This Institution was incorporated by Act of the Legislature of January 19th, 1852. It originated in a movement made by the citizens of Macon at a meeting for this purpose on April 15th, 1851. In January following, it was chartered, and 7 eminent men named as Trustees. The Act required them to “select the indigent blind of the State between the ages of 12 and 20 years, and maintain and educate them gratuitously,” and appropriated \$5,000 per annum for the years 1852 and 1853 to aid in supporting the Institution. The school was opened in July, 1851. Mr. W. S. Fortescue was the first Principal, and Miss Hannah Guilan the female teacher.

On February 18th, 1854, the Legislature appropriated \$10,000 to erect a suitable building. Further appropriations were afterward made and the building completed in 1860. Its total cost is about \$65,000.

This year (1876) there are 56 pupils in the Academy. Since its opening, 145 have been admitted; of these, 75 have been discharged as educated in one or more of the departments—many of them with trades by which they can earn their support.

Pupils are now admitted between the ages of 8 and 20; but males over 20 are taken into the workshop to learn trades.

The appropriation for 1876 for supporting the Institution was \$13,000—about an average of the yearly appropriations.

The value of the buildings, grounds, and property is \$75,000. There are about 1000 volumes in the Library, including those in embossed print.

The present Principal of the Academy, Rev. W. D. Williams, was elected to his position in August, 1858.

Miss Hannah Guilan, the first instructress, still occupies the same post. Hon. James Mercer Green, the President of the Board of Trustees from the beginning, deserves honor for his faithful discharge of duty. He is one of Georgia's best citizens. Preparations are now being made for receiving some

blind Negro children into the workshop. As yet there is no general provision made for educating the colored blind.

THE GEORGIA INSTITUTE FOR THE EDUCATION OF THE DEAF AND DUMB.—At the session of the Legislature in 1833, John J. Flournoy presented a memorial praying the establishment of an Institution for the education of deaf mutes. It was referred to the Governor with a request to obtain full information and report to the next meeting of the General Assembly. At the next session in November, 1834, His Excellency (Hon. Wilson Lumpkin) laid all the information he had obtained, before the Legislature, expressing himself particularly indebted to Governor Foot, of Connecticut, and Lewis Weld, the Principal of the Deaf and Dumb Academy at Hartford. In consequence of this correspondence, Mr. Weld came to Georgia with a class of deaf mutes, and gave an exhibition before the Legislature. That body appropriated \$3,000 for the education of the "indigent deaf and dumb of the State between the ages of 12 and 20 years," at the Asylum at Hartford.

Rev. Elijah Sinclair was appointed in March, 1835, by Governor Lumpkin, State Commissioner to look up the indigent deaf and dumb children of the State, convey them to Hartford, and have them supported and educated there at the expense of the State. He was faithful and zealous, being reappointed to the same work by 2 of the successors of Governor Lumpkin, and was complimented by the Legislature for his efficiency and integrity. He travelled extensively over the State searching for deaf mutes, but succeeded in sending only 6 to Hartford. In 1836, he found 16 in the State who came within the provisions of the law; but only 3 could be induced to go. In 1842 and 1843, Cedar Valley Academy, in Paulding County, made successful experiments in teaching deaf mutes. In December, 1845, the Legislature required all the State's beneficiaries to be withdrawn from Hartford and educated in Georgia.

Rev. Jesse H. Campbell, who was then State Commissioner, made an arrangement with the Hearn Manual-Labor School at Cave Spring, Floyd County, to make the education of the deaf mutes a Department of their school. Mr. O. P. Fannin,

then associate teacher in that school, was sent to Hartford, where he learned the method of teaching deaf mutes, and brought back the Georgia pupils, entering them in the deaf mute Department of the Hearn School. He opened in a log-cabin May 15th, 1846, with 4 pupils.

In 1847, the Legislature provided the means for erecting a suitable building. Cave Spring was selected, and the building completed in June, 1849, and occupied July 1st following. In the Spring of 1862, the Trustees suspended the operations of the Institution, and sent the pupils to their homes till after the war. It was reopened in February, 1867.

The average number of pupils is about 50. The whole number received up to this time is 253.

The appropriation for 1876 is \$16,500—about the annual average.

The Board of Trustees, in their report to the Governor for 1875, recommended that the Legislature make provision for receiving Negro children into the Institution, which that body at its last session adopted and carried into effect.

A suitable building located at Cave Spring, with 10 acres of land attached, was purchased for this purpose, and will soon be ready. Pupils are to be admitted to it, and provided for under the same rules as have heretofore existed, only they will be separate from the white pupils.

The value of the property at present is about \$25,000. There are about 1000 volumes in the Library. Prof. W. O. Connor is the Principal.

**THE LUNATIC ASYLUM OF THE STATE OF GEORGIA.**—The State of Georgia commenced this work in 1837. It was open for the reception of patients in October, 1842.

It had on December 1st, 1875, 587 patients. Of these there were of whites, 260 males and 237 females; and blacks 45 of each, or 497 whites and 90 blacks. The Asylum has 3,000 acres of land which is used for raising stock, vegetables, and other produce, to partly supply the Institution. In 1874, there were over \$13,000 worth of products raised, consisting mostly of vegetables; and 5,635 garments were made in the Matron's Department.

The Institution is under the general supervision of a Board of Trustees, appointed by the Governor. Its officers are a Superintendent and Resident Physician, 2 Assistant Physicians, 1 Steward and 1 Assistant, Treasurer, Secretary, Apothecary, Chaplain, and Matron. The salaries of these officers amount to \$12,800 per annum. The cost of its maintenance is in the neighborhood of \$100,000 a year. The cost of the Institution and grounds attached, and repairs and improvements from the beginning, amounts to over \$500,000. Dr. Thomas F. Green is the Superintendent and Resident Physician, who has occupied this position for 30 years. It is located at Milledgeville.

**THE GEORGIA BAPTIST ORPHANS' HOME.**—This is a Home for Orphans of the State of Georgia, located  $2\frac{1}{2}$  miles north of Atlanta. It was established by the Georgia Baptist Convention, in April, 1871. Hon. John H. James and Ex-Governor Joseph E. Brown, of Atlanta, Ga., were the prime movers in this benevolent enterprise, each contributing \$1,000. It has no endowments, and is supported by voluntary contributions. It has 10 acres of land and a good building with 10 rooms, which cost \$4,100. It has on hand over \$20,000 of assets, consisting of cash \$2,000, and obligations to contribute certain amounts, nearly \$20,000. The average number of orphans in the Institution is 25, receiving and discharging about 5 a year. The children are educated and taught to work, and good homes are sought out for them when they are 14 to 15 years of age, where they will be cared for and further educated.

**ORPHANS' HOME OF THE NORTH GEORGIA CONFERENCE.**—This Home for Orphans was established by the North Georgia Conference, M. E. Church, South, in 1867. The venerable Dr. Jesse Boring, a member of the Conference, originated the plan, and it was established mainly by his efforts. It is located near Decatur, De Kalb County, 6 miles from Atlanta; has 22 acres of land and improvements worth about \$6,000, and has nearly that amount of assets besides the property. It has an average of 30 orphans in the Home, who are under the superintendence of Rev. J. S. Lupo. They are educated and are also taught to work. They keep up a handsome farm by their labor. Only 3 of the boys are large enough to plough, but

this year they made 10 bales of cotton and 300 bushels of oats, besides other products, almost a full support for the Home. It has a Board of 12 Trustees—6 Ministers and 6 Laymen—all chosen by the Conference. The Governor-elect is one of the Board. V. R. Tommey, of Decatur, is Treasurer.

ORPHANS' HOME, SOUTH GEORGIA CONFERENCE.—This is located in Bibb County, near Macon. It was first founded by Mr. Maxwell, of Macon, as a private benevolent enterprise of his own, in 1857, and so continued until 1873, when it passed into the hands of the South Georgia Conference, M. E. Church, South.

From the beginning till now, 67 orphans have been received—29 of them since it became the property of the Conference—the present number being 17.

The Home has 100 acres of land, and the property is worth \$8,000, and out of debt. The children are taught in the elementary branches, and are brought up in the practice of farm and household work, and are kept till good homes can be secured for them. Rev. J. B. Wardlaw is the Superintendent.

THE MASONIC FRATERNITY OF GEORGIA.—This ancient Order was brought into Georgia with the first colonists. General Oglethorpe opened the first Lodge under a live-oak tree, at Sunbury. That tree died but a few years ago, and from it have been made Masonic tools, implements, and other articles, which are preserved as relics. A chair made of its wood is kept in Solomon's Lodge, No. 1, at Savannah.

The Provincial Grand Lodge of the State was established as early as 1735, if not before, by authority from the Grand Master of England, and so continued till February 6th, 1796, when the Grand Lodge of the State was incorporated by Act of the Legislature, and thus became an independent body.

The first Grand Master was Roger Lacey, by appointment of the Grand Master of England, whose service terminated in 1735. He was succeeded by Grey Eliot, who served from 1735 to 1786, and Samuel Elbert till 1787. From this time, the Grand Masters of the State were elected by the Grand Lodge. Rev. David E. Butler, of Madison, is the present Grand Master, and Dr. J. Emmett Blackshear, of Macon, Grand Secretary.

In 1820, there were 20 subordinate Lodges in the State, now there are over 300. In 1875, there were 15,168 Masons on the rolls of the Lodges that reported to the Grand Lodge, besides non-affiliated Masons and members of a few Lodges that did not report. The Order own the Southern Masonic Female College at Covington, Newton County.

**INDEPENDENT ORDER OF ODD FELLOWS.**—This order was introduced into Georgia by the establishment of Oglethorpe Lodge No. 1, at Savannah, in 1842, the charter being granted by John A. Kennedy, Grand Sire of the Grand Lodge of the United States, to Alvin N. Miller, John Dorsett, Gilbert Butler, and others.

The Grand Lodge of the State was organized November 13th, 1844—Alvin N. Miller the first Grand Master.

There are now 90 subordinate Lodges in the State, with nearly 3,000 members in good standing. Over 30 Lodges have been established in the last 5 years, and the Order is increasing rapidly. C. A. Robbie, of Augusta, is the present Grand Master; W. S. Gramling, of Atlanta, Deputy Grand Master; and John G. Deitz, of Macon, Grand Secretary.

There is also a Grand Encampment of the Order, and 17 subordinate Encampments in the State.

**INDEPENDENT ORDER OF GOOD TEMPLARS.**—This Order was first introduced into this State, at Atlanta, on October 28th, 1867, by Mr. J. G. Thrower. The Grand Lodge of the State was organized November 22d, 1869. There are 355 working Lodges in the State, having a membership of over 20,000. The average additions to the membership amount to more than 2,000 per annum.

J. G. Thrower, of Atlanta, is the Grand Worthy Chief Templar, and W. U. C. Shepherd, of Marietta, Grand Worthy Secretary.

The Grand Lodge of Georgia, 4 years ago, established the Independent Order of True Reformers, especially for the colored people, which has a large membership in this and the adjoining Southern States. The Georgia Grand Lodge of Good Templars at its last session (October, 1876) authorized the establishment of a separate Lodge of Good Templars exclusively for Negroes. This will be carried out without

delay, and the True Reformers will, no doubt, be merged with the Good Templars. The Good Templars of Georgia were the first in the South to move in this matter.

#### RELIGIOUS DENOMINATIONS IN GEORGIA.

**THE BAPTIST CHURCH.**—This denomination is more numerous than any other in Georgia. There are 114 Associations, over 2,300 Churches, and 193,662 members—nearly 1 to every 6 persons in the State. About 81,000 of the members are Negroes.

Of the Associations, 34 are organized into what is known as the “Baptist Convention of the State of Georgia ;” and all have the privilege of uniting with it at any time.

The first Baptist in Georgia of which there is any history was Nicholas Begewood, in 1757. He was employed as an agent of Whitefield’s Orphan House, near Savannah. Entertaining Baptist sentiments, he went to Charleston to unite with the Church and receive baptism. In 1759, he became a minister, and in 1763 baptized several persons about the Orphan House, to whom he administered the first Baptist Communion in the Province.

The first Baptist Church organized in Georgia was in 1772, at Kiokee Meeting-House—the spot on which Appling in Columbia County now stands—under the ministry of Rev. Daniel Marshall, who was then the only ordained Baptist minister in Georgia.

The second was in 1773, at a place then called New Savannah, afterward Botsford’s Old Church, 25 miles below Augusta, under the ministry of Rev. Edmund Botsford.

The Baptist Convention of the State was organized in 1822 at Powelton, Hancock County. Its objects, among others, are :

To aid in giving effect to useful plans of the several Associations ;

To raise funds for the education of pious young men for the Christian Ministry; and

To promote pious useful education in the Baptist denomination.

Rev. Jesse Mercer was Moderator of the first meeting of

the Convention, and was successively chosen to that position every year, up to the last year of his life—his period of service being from 1822 to 1840 inclusive.

Rev. D. E. Butler, of Madison, is the present Moderator, and Rev. G. R. McCall, of Hawkinsville, is Secretary. The Convention has charge of all the educational and charitable institutions belonging to the denomination in the State. It has a permanent fund of its own, of nearly \$34,000, the interest only of which is used annually in its appropriate work. This Convention is a highly respected and influential body. The educational institutions which are the property of the denomination in Georgia, and under the control of the Baptist State Convention, are : Mercer University, Macon ; Mercer High School, Penfield ; Crawford High School, Dalton ; Hearn School, Cave Springs.

This denomination has 702 Sunday-schools, 4,138 officers and teachers, and 31,389 scholars in the State, of which 105 schools and 6,700 scholars are composed of Negroes.

**THE METHODIST EPISCOPAL CHURCH, SOUTH.**—John Wesley, the founder of Methodism, came to Georgia, and commenced preaching in Savannah, early in 1736, followed by George Whitefield in 1738. This may be properly regarded as the introduction of Methodism into America, though the Church by that name was not formally established in this country till many years afterward. Mr. Wesley, in his writings, refers to this date as the “second rise of Methodism.”

The Methodist Episcopal Church in America was formally organized in Baltimore in 1784, in consequence of the separation of the colonies from Great Britain.

Methodist preachers entered Georgia in 1785 at Augusta, from North Carolina and Virginia ; and the territory of Georgia was soon after included in the South Carolina Conference. Conspicuous among these pioneers are the names of Thomas Humphries and John Majors—volunteers from a conference in Virginia—who preached on a circuit extending from Savannah to Wilkes County. They reported 450 members in Georgia in 1786.

Among the active Methodist ministers in Georgia of the early period were Hope Hull, John Gavin, Stith Mead, and Levi Garretson ; and as early as 1806, Lovick Pierce, father

of Bishop George F. Pierce, was a preacher in active work, and is still living—now in his 92d year, possessing all his faculties, and preaches with remarkable vigor.

Up to 1830, Georgia was included in the South Carolina Conference, but that year the Georgia Conference was formed. For the year 1831, the membership of the Georgia Conference was 21,385 whites and 6,167 blacks; and 95 itinerant preachers.

In 1866, the Georgia Conference was divided into the North Georgia and the South Georgia Conferences. At the time of the division, there were in Georgia 215 itinerant ministers, and 51,219 white members.

The following shows the condition of the two Conferences at the end of the year 1875 :

*North Georgia Conference.*—Number of church-buildings, 643; capable of seating 171,000 persons; itinerant preachers, 168; local preachers, 425; number of members, 53,754; Sunday-school scholars, 27,171; number of Sunday-schools, 527; value of church property, \$700,000.

*South Georgia Conference.*—Number of church-buildings, 406; capable of seating 99,157 persons; itinerant preachers, 123; local preachers, 221; number of members, 29,304; Sunday-school scholars, 12,332; value of church property, \$412,640.

In 1871, the Negro membership of the Methodist Church in the South was set up as an independent organization, and designated "The Colored Methodist Episcopal Church of America." The first general conference of this body was held at Jackson, Tenn., in that year, at which Bishops Paine and McTyeiere, of the Methodist Episcopal Church, South, ordained two colored Bishops. The strength of this organization in Georgia, in 1875, was 13,752 members.

The Methodist Episcopal Church, South, have several institutions of learning in Georgia. Emory College at Oxford, and Wesleyan Female College at Macon, are both colleges of a high order. Besides these, there is La Grange Female College at La Grange; Dalton Female College, Dalton; Andrew Female College, Cuthbert; and Collingsworth Institute, near Talbotton—all the property of the two Conferences in Georgia, and are of long standing and established reputation, having pro-

fessors of ability, and are well patronized. The educational facilities of this denomination in Georgia are ample.

Besides these, there are two Houses for Orphans belonging to the Church—one located near Atlanta, the other near Macon—both of which are well sustained.

**THE METHODIST EPISCOPAL CHURCH, NORTH.**—In January, 1866, Bishop Clark, of Cincinnati, with 10 ministers, all white, organized this Church in Georgia at Atlanta. Nearly all the members then enrolled were white.

The first regular Conference was held in Atlanta, in October, 1867, Bishop Clark presiding.

There were present 28 white and 9 colored preachers. The work of the Church has been largely among the Negroes.

In 1875, there were in Georgia 193 church-buildings, worth \$118,065. The membership numbers about 15,000, about 12,000 being colored. There are 395 preachers, 101 of whom are itinerants, the others local; 194 Sunday-schools, 716 officers and teachers, and 8,738 scholars. There are now two Conferences of this denomination in Georgia, one for the Whites and the other for the Negroes.

In Atlanta, there is an incipient University (called Clark University) with \$25,000 worth of property, besides 450 acres of land near the city.

The Church has academies for the education of Negro children at La Grange and Waynesboro, and church-schools at Rome, Newnan, and Grantville.

A white school of high grade, called the Ellijay Seminary, and belonging to the Church, has been established at Ellijay, Gilmer County. It is a handsome, well-constructed brick edifice, costing \$8,000. The school is well patronized.

**OTHER METHODIST CHURCHES.**—Besides the Southern and Northern branches of the Methodist Church in Georgia, there are the Protestant Methodist Church—membership, 2,500; the Colored Methodist Episcopal Church of America—membership, 13,752; and the African Methodist Episcopal Church—membership, 40,153.

**THE PRESBYTERIAN CHURCH.**—This element in Georgia was largely derived from Scotch-Irish immigrants from North Carolina and other States, and their descendants.

Presbyterianism was introduced into Georgia at quite an early date. A few churches are known to have existed ; one in "St. Paul's Parish" (Augusta), one at "Brier Creek," and one at "Queensborough," the last two supposed to have been in Burke County. In 1735, a colony of Scotch Presbyterians located at New Inverness, now Darien, in McIntosh County, at the mouth of the Altamaha River. Rev. John McLeod was their pastor till 1741. The Independent Presbyterian Church of Savannah was organized about the year 1765 or before.

The early churches were necessarily weak and remained so for some time, being dependent upon visiting ministers from Carolina and the older colonies or States. It was not till 1796 that the Church was organized and established in Georgia.

At that time, the Presbytery of Hopewell was set off from that of South Carolina. It consisted of only 5 ministers and about 16 churches, located principally in the eastern-middle portion of the State, now embraced in the Counties of Wilkes, Oglethorpe, Greene, Hancock, Burke, and others. The first Presbytery was held in Wilkes County, at Liberty Church, March 16th, 1797. The names of the ministers constituting it were John Newton, John Springer, Robert M. Cunningham, Moses Waddell, and William Montgomery.

From this small beginning, it has steadily grown till it is a Synod, embracing 5 Presbyteries and extending all over the State. There are, at present, 74 ministers, 8 licentiates, 8 candidates, 143 churches, 135 church-edifices, 51,610 sittings, 8,103 members, 76 Sabbath-schools, 4,485 Sabbath-school scholars, and the value of church property \$578,450. Contributions for all purposes during the past year amounted to \$87,277, averaging \$10.75 for each member.

Previous to the war, the denomination had a flourishing college at Midway, Baldwin County, known as Oglethorpe University, but it had the misfortune to have its funds swept away by the war. It grew out of a manual-labor school, which was suggested by Rev. C. W. Howard, the pastor of the Presbyterian Church at Milledgeville, and whose exertions secured its establishment about 1836, under the auspices and patronage of Hopewell Presbytery. Afterward, through Mr. Howard's exertions, it was changed to a college, under the name of Oglethorpe University. Mr. Howard proposed

the name, and he raised in Georgia in one year, subscriptions to endow it to the amount of \$120,000. Since the war, it was removed to Atlanta, and an effort made to resuscitate and re-endow it, but it was unsuccessful; and the Synod has abandoned the effort for the present. The apparatus and other property have been returned to Midway, and, with the former buildings of the college, are used and occupied by Talmage High School, which is well patronized. The property is worth \$25,000.

There are several other Presbyterian organizations in the State. The Independent Presbyterian Church of Savannah is a large, wealthy, and influential body.

The Associated Reformed Presbyterians consist of 6 churches, 6 church-edifices valued at \$8,000, having 2,000 sittings, 530 members, 6 Sunday-schools and 300 scholars, and 5 ministers.

The colored people have a Presbytery of their own, styled Knox Presbytery, consisting of 6 churches and church-edifices, 6 ministers, and 1,000 members.

The Presbyterian element in Georgia may be set down as 157 church organizations, 146 church-edifices, 56,000 sittings, 86 ministers, 9,403 members, 88 Sabbath-schools and 5,085 scholars, with church property amounting to \$653,450.

THE PROTESTANT EPISCOPAL CHURCH IN GEORGIA.—This Church commenced its work in Georgia in 1732, through Rev. Henry Herbert, who came over with the first emigrants. He was followed by Rev. Samuel Quincy in 1733, John Wesley in 1736, and George Whitefield in 1738. The only parish of which John Wesley and George Whitefield were ever rectors was Christ Church, Savannah.

Both John Wesley and George Whitefield established Sunday-schools in Georgia, nearly 50 years before Robert Raikes originated the scheme of Sunday instruction in Gloucester in England, and 80 years before a Sunday-school on his plan was established in New York.

In 1758, the Colonial Assembly divided the Colony into parishes.

The first Episcopal Bishop who ever visited Georgia was Bishop Dehon, of South Carolina, in 1815, to consecrate the new church-building for Christ Church, Savannah, where he

confirmed a class of 60, the first confirmation ever held in Georgia.

The first Convention of the Diocese of Georgia was held in Augusta, 1823.

Rev. Stephen Elliott was elected the first Bishop of the Diocese in 1840, and consecrated in 1841. He held the position until his death, nearly 25 years, and was succeeded by Rev. John W. Beckwith in 1867, who is the present Bishop.

The Journal of the Convention of the Diocese in 1876 shows 29 churches and stations, having 11,000 sittings; church property amounting to \$350,600; 4,500 communicants, and 39 clergymen. There are 25 Sunday-schools, having 366 teachers and 2,613 scholars. Total contributions for all purposes for the year ending May, 1876, \$695,542.22, or about \$15 for each member.

**THE CHRISTIAN CHURCH.**—This denomination being strictly Congregational in its government, and having no organization similar to a Synod, Conference, or State Convention, its statistics from year to year in Georgia have never been compiled; and we have been unable to obtain information showing its introduction into the State or its progress since that time. The figures, showing its present status, are estimates by one who is most familiar with it, and are approximately correct and reliable as such.

There are say 50 churches, 5,000 members, and 40 ministers. The churches have about 20,000 sittings, and the value of the church property is about \$150,000. Several of Georgia's eminent divines are connected with this Church.

**THE CATHOLIC CHURCH IN GEORGIA.**—In the Charter granted by George II. to the Trustees of the Colony of Georgia, the King said: "We do, by these presents, for us, our heirs, and successors, grant, establish, and ordain, that forever, hereafter, there shall be a liberty of conscience allowed in the worship of God to all persons inhabiting, or which shall inhabit or be resident within our said province, and that all such persons, except papists, shall have a free exercise of religion; so they be contented with the quiet and peaceable enjoyment of the same, not giving offense or scandal to the Government."

The exception of "papists" was swept away in the Constitution of 1777, after the Declaration of Independence, as not in accordance with the sentiments of a free people; indeed, Catholics were never molested in Georgia on account of their religious faith, either during the colonial history or since.

The first Catholic Church established in Georgia was at Locust Grove, in Taliaferro County, 7 miles from Crawfordville, by a colony of Catholics from Maryland in 1794. Soon after, a number of Catholics, refugees from the horrible massacres of San Domingo, came to America. Numbers of them settled in Savannah and Augusta, where they were most kindly received. A priest of these refugees went to Locust Grove, and was the first Catholic clergyman that ever officiated in Georgia.

At that time, Georgia and both the Carolinas were subject to the See of Baltimore—Bishop Carroll—and so continued till July 11th, 1820, when the Carolinas and Georgia were raised to a distinct Diocese by the appointment of Dr. John England, who was the first Bishop of Charleston, with the three States as his field.

At that time there was only one church in Georgia (in Augusta) which was occupied, the congregations at Locust Grove and Savannah being without pastors.

Bishop England was a man of great learning, a wonderful preacher, very zealous and laborious, and very liberal toward other denominations. He often preached in their churches, and in court-houses or school-houses where he travelled, leaving a most favorable impression upon all persons, whether Catholic or Protestant. He died in April, 1842, and was succeeded by Rev. Ignatius Reynolds till November 10th, 1850, when the State of Georgia was erected into a distinct Diocese, and Rev. Dr. Gartland appointed the first Bishop of Savannah. After his death, he was succeeded by Bishops Barry, Verot, and Persico; and on April 27th, 1873, the present Bishop, Rt. Rev. Wm. H. Gross, was appointed.

Since his episcopate, the Church in Georgia has founded and built Pio Nono College at Macon, a splendid Cathedral at Savannah, and an Orphan Asylum at Washington. The order of Jesuits has also been introduced at Augusta.

Convents of the Sisters of Mercy are at Savannah, Augusta,

Macon, Columbus, Atlanta, and Dalton. This order was introduced into Georgia at Savannah in 1845.

In 1836, there were about 5,000 Catholics in Georgia. Now there are 25,000 to 30,000. There are 25 churches, 35 chapels, 24 priests, 3 male and 7 female religious institutions, 1 college of high order, 1 Orphan Asylum, church property valued at from \$400,000 to \$500,000, and convent property about \$150,000 to \$200,000.

**THE LUTHERANS.**—This Church in Georgia lacks two years of being as old as the State. The Salzbergers landed in Savannah March 12th, 1734, and settled in Eben-Ezer, in Effingham County, where lands were allotted to them by General Oglethorpe. Here they built Ebenezer Church, the first Lutheran Church in Georgia. There are now 4 Lutheran churches in Effingham County. The Lutheran Church in Savannah was established in 1759 or before. This denomination had in Georgia, in 1870, according to the United States Census, 11 church organizations, 10 church-edifices, 3,000 sittings, and church property valued at \$57,100.

**OTHER CHURCHES.**—We have been unable to obtain particulars of the Congregational and Universalist Churches in Georgia other than what are contained in the United States Census of 1870, and can only present the statistics therein given as follows—viz.:

Congregationalists—10 churches, 2,800 sittings, and church property valued at \$16,550.

Universalists—5 church organizations, 3 church-edifices, 900 sittings, and church property valued at \$900.

**ISRAELITES.**—The number of Israelites in Georgia is about 2,620 souls, distributed as follows: Atlanta, about 550; Savannah, about 750; Macon, 300; Columbus, 200; Rome, 90; Augusta, 250; Americus, 80; Albany, 100. In other towns, 300.

The larger cities have synagogues—some of them very elegant—and all newly erected. Those at Savannah, Macon, and Atlanta are collectively worth about \$100,000. There are only 3 priests or Hebrew ministers in the State: Rev. H. Gersoni, in Atlanta; Rev. M. Harris, of Savannah; and Rev. S. Levinsohn, of Augusta.

In other communities, the Israelites are united in congregations and hold services, inviting ministers from the cities named to perform such special religious rites as marriages, burials, circumcisions, etc.

There are lodges of the Jewish orders of Bnai Berith, and Keshar-Shel-Barzel or Free Sons of Israel, in almost every city in the State.

Every Jewish community keeps up benevolent societies for the assistance of the needy and the occasional poor who pass. In the larger cities, female benevolent societies are formed besides those maintained by the males.

In Georgia, the Israelites have no educational institutions of their own except Sabbath-schools, which are devoted to religious instruction only. They patronize the public schools for secular education.

#### THE GEORGIA STATE AGRICULTURAL SOCIETY.

Hon. Mark A. Cooper, now residing in Bartow County, near Cartersville, first suggested the formation of this Society, and a general plan or method of proceeding so as to insure success. As the result of his suggestion, early in the summer of 1846 there appeared in the newspapers of the State, a call signed by 44 prominent men, for an "Agricultural Fair and Internal Improvement Jubilee" at Stone Mountain, in De Kalb County, 18 miles from Atlanta. Three of these, George W. Crawford, Charles J. McDonald, and Wilson Lumpkin, have been Governors of the State. In the call, they express the belief that great good may result to the planting interest of Georgia, Carolina, Alabama, and Tennessee, from a personal interchange of the results of their experience, accompanied by an exhibition of the products of their farms, and "suggest the propriety of those engaged in Agricultural pursuits, and such others as may feel an interest in the subject, meeting at some central point in the up-country for that purpose." They named "Stone Mountain as the place most suitable," and fixed the time near the 1st of August, because by that time "the several railroads in Georgia will be finished, at least from Oostenaula to the seaboard."

The meeting assembled August 7th, 1846. Mark A. Cooper

was Chairman, and David W. Lewis, of Hancock, Secretary. They formed a Society for "developing and illustrating" the resources of the country, and 51 gentlemen subscribed their names as members, paying the membership fee of \$1 each. They then elected permanent officers as follows :

Hon. Thomas Stocks, of Greene, President; David W. Lewis, of Hancock, Secretary; and Wm. M. D'Autignac, of Richmond, Treasurer; and resolved to hold a Fair annually "for the exhibition and sale of all such products of Agriculture and Horticulture as may be contributed by members and citizens, . . . to include animal and vegetable products of Plantations, Farms, Gardens, Orchards, and Dairies; Agricultural Implements and Articles of Domestic Manufacture, useful to the farmer or planter."

Such was the beginning of the Society, which has become famous and useful in the State and the whole country.

Fairs were held in 1847, '48, and '49, at Stone Mountain; 1850 at Atlanta, and 1851 at Macon.

When it was organized, it was called "The Southern Central Agricultural Society," the aim being to include the people of adjoining States, and it was chartered by that name February 17th, 1854.

In 1860 (December 20th), its name was changed to that of the "Georgia State Agricultural Society," and a new charter obtained, in which the sum of \$2,500 per annum was appropriated from the State Treasury, in aid of the Society.

During the war, its operations were suspended, but in 1868 it was reorganized, and a Fair held in Macon in 1869, and continuously every year since, alternately at Macon and Atlanta, except the present year 1876, it being postponed till 1877, on account of the Centennial Exhibition.

The Society is a representative body, composed of prominent and intelligent men elected annually by local organizations. It also has a number of life-members, and justly has large influence in the State. Through its earnest recommendation, the office of State Geologist and the Department of Agriculture were established by the Legislature in 1874, and it had much to do in procuring the passage of a law for the inspection and analysis of commercial fertilizers.

The exhibitions at its Fairs are always superior and very largely attended, not only by the people of Georgia, but of the States, North and South.

The essays and addresses delivered at its semi-annual Conventions are not excelled in ability, learning, instruction, and practical usefulness by those of any similar organization in the United States, and are truly occasions of very great interest.

The Spring Convention is held annually in February, in the southern portion, and the Summer Convention in August, in the northern portion of the State.

The Presidents of the Society have been as follows :

Hon. Thomas Stocks.....	1846 to 1854
Hon. Mark A. Cooper.....	1854 to 1856
Dr. L. B. Mercer.....	1856 to 1858
Hon. D. W. Lewis.....	1858 to 1860
and was President up to the time of its reorganization in 1868, after the war.	
Col. B. C. Yancy.....	1868 to 1871
Gen. A. H. Colquitt (Governor-elect).....	1871 to 1876
Hon. T. F. Hardeman, President-elect—term to commence in February next.	

The office of the Society is in the State House, Atlanta ; Mr. Malcolm Johnson, Secretary. It has a Library of about 3,500 volumes.

In this connection, it is not inappropriate to give a passing tribute to Hon. Thomas Stocks, the first President of the Society. He died October 6th last (1876), at his home in Greene County, near the spot where he was born, at the advanced age of nearly 91 years. He was born in a fort, February 1st, 1786, where his parents were living, as a protection against hostile Indians, and was the first white child born in Greene County. In the year 1820, he was elected to the Georgia State Senate, and held that position by successive elections for more than 20 years, and was for several terms the President of that body. He voluntarily retired, and never afterward in any way entered the arena of politics further than to cast his vote at elections. He was a consistent member of the Baptist Church for nearly 50 years, and a prominent man in that denomination, active and

useful in all the educational and benevolent enterprises of the Church.

He succeeded Dr. Jesse Mercer as the President of the Board of Trustees of Mercer University, in 1840, from which he voluntarily retired in 1866. He was an active member of the Executive Committee of the Baptist Convention of the State of Georgia, from 1830 to 1847, when he was chosen Moderator of that body, to which position he was successively chosen for 10 years. In 1846, as before stated, he was chosen President of the State Agricultural Society, and held that office till 1854, when he voluntarily retired.

When his friends and fellow-citizens gathered around his bier to pay the last tribute to his honored ashes, no incident occurred more touching than a procession of 40 or 50 of his former slaves, now laboring upon his plantation, who had come to take a last look at the face of their old master, who had been their best earthly friend. Unrestrainedly they gave evidence of the profound sorrow of their simple hearts, at the loss of their benefactor.

#### THE DEPARTMENT OF AGRICULTURE OF THE STATE OF GEORGIA.

Nearly all the States of the Union give encouragement to agriculture in some way, generally by the appointment of a State Board of Agriculture, which superintends the holding of a State Fair, and the State paying for the publication of a certain number of copies of the transactions of the Board, and the essays or addresses produced on Agriculture or cognate subjects.

Georgia has not been listless, but has been foremost, in some respects, in measures to improve the Agriculture of her people.

The State Agricultural Society was formed in 1846, and, in 1860, the Legislature appropriated \$2,500 per annum to aid in holding its annual Fairs and for other purposes. This is an able, influential, and highly respected association, which has accomplished an untold amount of good. The assistance given it by the State has been repaid many-fold.

This Society, at its session in Atlanta, in August, 1870, adopt-

ed resolutions calling upon the Legislature to establish a *State Department of Agriculture*, which would be "commensurate with the interests to be subserved, . . . upon such a basis as will largely and liberally provide for all purposes of information, improvement, and guidance of the Agricultural interests of the State; . . . and include the devising of improved methods of estimating the probable acreage and crops of the country, and of making a virtual census annually, embracing all crop topics capable of reasonable and probable anticipation, as well as of actual results;" and declared that the "great object of the Department should be to give intelligent direction to the practical industry of the State; to disseminate information which will tend to increase the production, and to the not less important matter of the judicious and profitable sale of products; to place the producer on a level with the speculator and consumer in his knowledge of the elements of price;" and to "adopt the most improved method of preserving, on a large scale, observations on the weather, seasons, temperature, and other phenomena, to increase the means of anticipating results; and that, in connection with it, there should be established an experimental farm, a place for the exhibition of tools and implements, a museum, cabinet, and such other means and appliances as shall subserve the important purposes of its foundation."

At the meeting at Columbus in February, 1874, similar resolutions were adopted. These declare that "our thrift and well-being require that the farming and material interests should have a State Agricultural Department established."

The Georgia State Grange, at its session in Macon, in the winter of 1873, passed similar resolutions.

His Excellency J. M. Smith, the present Governor of Georgia, in his annual message to the Legislature, January, 1874, strongly recommended "the establishment of a Department of Agriculture for the State." He said:

"Men now distrust analyses and experiments which are given to the world on unofficial endorsement. Could the information, so much needed in the every-day operations of field and shop, be sent forth from such a department, . . . it would carry with it a weight and sanction rendering it acceptable to the public. Here could be gathered from every source

the most advanced ideas and methods affecting the great interests committed to this Department."

The result was the passage of a bill, approved February 28th, 1874, "to establish a Department of Agriculture for the State of Georgia."

This Act required the Department to be under the "control and management of one officer, who shall be known as the Commissioner of Agriculture," to be appointed by the Governor, with the advice and consent of the Senate, and appropriated \$10,000 per annum to pay necessary employés and expenses and carry on the work of the Department.

The creating Act prescribed the following as the duties of the Commissioner :

"SEC. IV. That the duties of said Commissioner shall be :

"1. He shall prepare, under his own direction, a hand-book describing the geological formation of the various counties of this State, with information as to the general adaptation of the soil of said counties for the various products of the temperate zone, and for the purpose of giving a more general and careful estimate of the capacity and character of the soil of the counties of this State ; to obtain a correct analysis of the same, he shall be furnished by the Executive of this State, from the State Treasury, with a sum of not more than one thousand (\$1,000) dollars, with which to furnish a sufficient chemical apparatus to use in connection with said office, for the purpose of analyzing the soils and minerals of this State, as he may deem of importance. Information upon the above subjects, and others of interest to those who till the soil of this State, shall be given in circular or pamphlet form, to the Ordinaries and to the Agricultural Associations of the various counties in this State, for distribution at such times as the Commissioner may be prepared to do so.

"2. Said Commissioner shall provide for the proper and careful distribution of any seeds that the Government of the United States may desire to introduce into the State of Georgia, and shall make arrangements for the importation of seeds that he may deem of value to this State, and for the proper, careful, and judicious distribution of the same ; also, for the exchange of seeds with foreign countries or adjoining States, for seed from this State ; and their distribution in a proper manner shall be entirely under his supervision and control.

"3. Said Commissioner shall have under his especial charge the study of the various insects that are injurious to the crops, plants, and fruits of this State, their habits and propagation ; and he shall, at various times, as he may deem proper, issue circulars for distribution as aforesaid in this State, as to the proper mode for their destruction, and any information upon said subject that he may deem of interest to the planters, farmers, and horticulturists of this State.

"4. Said Commissioner shall examine into any question that may be of interest to the horticulturists and fruit-growers of this State, and in all endeavors that he may deem proper toward encouraging these important industries.

"5. Said Commissioner shall have under his especial charge the diseases of the grain, fruit, and other crops of this State, and he shall, at various times, report upon any remedy for said diseases, or any useful information upon said subject, and he shall employ, in a manner that he may deem fit, a chemist to assist him in his researches, and a geologist to assist him in preparing a geological survey of the State, and other business that he may deem of importance to advance the purpose for which this Department is created.

"6. Said Commissioner shall have under his especial charge the analysis of fertilizers. A fair sample of all fertilizers sold in this State shall be first submitted to said Commissioner, and the same shall be thoroughly tested by him, and if any brand of fertilizers so tested by said Commissioner is pronounced of no practical value, the sale of the same shall be prohibited in this State; and any person violating the provisions of this Act, or selling any fertilizer in this State without first submitting a fair sample of the same to said Commissioner, under rules to be prescribed by him, shall be guilty of a misdemeanor, and shall be liable to be prosecuted and punished for the same, as is now provided in paragraph 4,310 of the Code of Georgia as last revised.

"7. Said Commissioner shall report, as is hereinbefore set forth, upon any matter of interest in connection with the dairy that he may deem of interest to the people of this State.

"8. It shall be the especial duty of said Commissioner to investigate and report, as is hereinbefore set forth, upon the culture of wool, the utility and profits of sheep-raising, and all the information upon this important subject that he may deem of interest to the people of this State.

"9. Said Commissioner shall investigate the subject of irrigation, and what portion of this State can be most benefited thereby, and all information upon this subject that he may deem important to the people of this State.

"10. Said Commissioner shall give attention to the subject of fencing, and shall report at such times as he may deem proper upon said subject, as is hereinbefore set forth.

"11. Said Commissioner may report, in the manner as is hereinbefore set forth, upon any matter or subject that he may deem of interest to the agriculture of this State."

The Department was established in September, 1874, the Governor appointing Dr. Thomas P. Janes, of Greene County, the Commissioner, a practical and successful farmer who never before held any office, and who at once entered upon the discharge of his duties.

Thus the State of Georgia was the first in the Union to

establish a State Department of Agriculture as a branch of the State Government, and with a salaried State House officer at its head, having prescribed duties requiring continual services.

Already (in two years) much good has been accomplished. During the crop seasons of 1875 and 1876, circulars, showing the condition of the crops and seasons in nearly every county in the State, have been published, which are much sought for, and are partly or wholly published by most of the papers in the State.

A large amount of valuable information upon labor and various features of farm economy, stock-raising, the cultivation of the grasses, forage, and other crops, upon which the farmers of Georgia have not hitherto been generally well informed, is gathered up by the Department and published, which has made a decided impression upon the farming interests of the State. It has compiled and published a small "Manual of Sheep-Husbandry in Georgia," which has largely influenced numbers of persons in the State to embark in the business—many of them quite extensively. It is preparing similar Manuals on Hog-raising and Cattle-raising in Georgia, which will be followed by Manuals on other subjects affecting Agricultural and Home Interests.

The most important demonstrated results for good have been shown in the supervision which the Department has exercised over the inspection, analysis, and sale of commercial fertilizers in the State. Before it was established, there was a law requiring the inspection and analysis of fertilizers, but there was no one officer designated to prescribe uniform rules and enforce the law, which was not only defective, but was thus inefficiently executed ; hence our farmers were much imposed upon by the sale of spurious or worthless compounds, of whose value they were wholly unable to form any correct estimate.

The Commissioner, at the end of the first season after the Department was established, published the Analysis, Price, and actual Commercial Value, of every fertilizer sold in the State. This was in June, 1875. It made a decided impression. Every person was able to see these facts concerning every fertilizer sold in Georgia put in print, side by side, for comparison.

The Commissioner also required 500 lbs. of each brand

sold, to be placed in the hands of experienced and careful farmers in different sections of the State, to be subjected to a careful soil test.

In January, 1876, early in the fertilizer season, the Analyses and Prices with Commercial Values of the fertilizers then on sale were published, and to this was annexed the result of the experiments or practical soil tests made the season before ; and in June following, the Analyses, Prices, etc., of the whole season were published.

From these publications, the farmers of Georgia have the means of ascertaining the agricultural value of any brand of fertilizer offered for sale ; and the enforcement of the Inspection Laws has been such that no poor article of fertilizer can go to sale in the State. No farmer can buy a worthless fertilizer in Georgia, for it will not be admitted to sale.

This supervision has, in one single season, saved to the farmers of Georgia in actual cash not less than \$1,500,000, as demonstrated by the increased actual value of the fertilizers sold over those of the preceding year, and the decreased price at which they were sold ; also, the more intelligent and judicious purchase of commercial fertilizers, and a more scientific and economical use of home manures—all resulting from this supervision. This saving amounts to \$1.27 per annum for every individual in Georgia ; while the entire expense to the State of the Department is only one cent and one sixth of a cent per annum to each individual.

#### STATE GEOLOGICAL SURVEY.

Governor William Schley, in his Annual Message to the Legislature, November 8th, 1836, strongly urged the Legislature to provide for a Geological Survey of the State. After giving reasons why it should be done, he said : "I suggest the propriety of employing a competent geologist to make a thorough survey of the State, with a view to the ascertainment of its mineral and agricultural resources, and the proper location of works of internal improvement."

In compliance with this recommendation, the Legislature adopted a resolution authorizing the Governor to employ a "suitable and well-qualified person to undertake the work of a

careful and scientific survey of all the Counties in Georgia," and appropriated \$10,000 to carry it on.

On January 6th, 1837, the Governor appointed Dr. John R. Cotting State Geologist. On December 11th, 1840, the Legislature abolished the office, which discontinued the survey.

This disappointment to the public to secure the expected benefits operated greatly against the success of future efforts to put a State Geologist into the field.

The State Agricultural Society, which has been prominent in leading off in favor of important measures affecting our great interests, several times urged this matter upon the attention of the Legislature. In November, 1851, at the great Fair held that year in Macon, a committee, consisting of Dr. W. C. Daniell, Benjamin E. Stiles, and James M. Davison, was appointed to memorialize the Legislature for an appropriation for a Geological Survey of the State. It showed great research and acquaintance with the advanced sciences of the day, presented the advantages of such a survey, and was a strong document, but was ineffectual.

The Convention at its session at Griffin, in August, 1872, resolved, "as the sense of this Convention, that the Legislature should provide for a Geological Survey of the State;" and the Convention at Augusta in 1873, resolved, "that it is the sense of this Convention, that the present General Assembly of the State of Georgia ought to pass the Bill now pending before it creating the office of State Geologist." The Bill did not pass at that session, but at the session of 1874 an Act was passed (approved February 27th) creating the office of "State Geologist of the State of Georgia," authorizing the Governor to "nominate a competent person to this office to be confirmed by the Senate." The Act requires the State Geologist "to make a careful and complete geological, mineralogical, and physical survey of the State; to enter upon records to be kept for that purpose in his office, an accurate statement of the locality and extent of all water-powers, woods, roads, springs, and water-courses, and the climate and the general physical character of the country; to collect, analyze, and classify specimens of minerals, plants, and soils, and enter the same of record; to cause to be preserved in a museum, specimens illustrating the geology, mineralogy, soils, plants, valuable woods, and what-

ever else may be discovered in Georgia of scientific or economical value."

In compliance with this Act, His Excellency Gov. James M. Smith appointed Dr. George Little, Professor of Mineralogy and Geology in the State University of Mississippi, who organized the Department in September, 1874, and is still prosecuting this highly important work. The appropriation for it is \$10,000 per annum.

#### GEORGIA STATE HORTICULTURAL SOCIETY.

This Society was chartered on July 14th, 1876, and organized on August 16th following, on a solid basis of stock subscribed, and with a membership of many of the most active and intelligent Horticulturists in the State.

Its officers are a President, a Vice-President for each Congressional District, a Secretary, and a Treasurer. The President, Secretary, Treasurer, and half the Vice-Presidents are elected annually.

Its membership consists of stockholders and annual members. The shares are \$10 each, 10 per cent of which is paid in at present. Authorized stock, \$10,000, with a margin of extension of \$50,000.

Stockholders have exclusive control of all questions of finance.

Annual members pay an annual fee of \$2.00 each, and have full privileges of membership except in matters relating to finance.

The meetings of the Society may be annual or semi-annual at the option of the Society. At present, it holds an annual convention and exhibition during the first week in August.

The office of the Society, under the charter, may be either at Atlanta, Macon, or Augusta, or at either of them alternately.

P. J. Berkman, of Augusta, is President; J. S. Newman, Atlanta, Secretary; and H. J. Peter, Macon, Treasurer.

This organization represents a very important interest, which needs only proper direction to be developed into a Commercial and Domestic importance of no mean consideration.

## NEWSPAPERS IN GEORGIA.

There are 9 daily, 91 weekly, and 4 monthly newspapers and periodicals in Georgia, having an aggregate circulation of about 150,000 copies, classified as follows :

*Daily*.—9, News and Political—aggregate circulation, 35,900. (This includes the daily, tri-weekly, and weekly editions of these papers ; and these weeklies are not counted with the other weeklies of the State.)

*Weekly*.—84, News and Political—aggregate circulation, 74,500.

*Weekly*.—4, Religious—aggregate circulation, 19,500.

*Weekly*.—2, Literary—aggregate circulation, 11,500.

*Weekly*.—1, Agricultural—aggregate circulation, 4,500.

*Monthly*.—2, Medical—aggregate circulation, 1,550.

*Monthly*.—2, Agricultural—aggregate circulation, 2,850.

### III. THE PRODUCTIONS.

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THE third and last great division of our subject is PRODUCTION.

We have treated of the COUNTRY and the PEOPLE ; it remains to treat of the results of the labor of the People applied to the Country.

This takes two forms—viz., wealth, or the accumulation of past Production, and current or annual Production. Both are the results of Man's work applied to Nature.

Previous to 1861, Georgia compared very favorably with the other States of the Union in wealth, ranking 6th in 1850 and 8th in 1860.

The results of the war, however, destroyed the accumulations of half a century, reducing the aggregate wealth of the people of the State from \$672,322,777 in 1860 to \$191,235,520 in 1868. It would therefore be unjust to compare the wealth of Georgia now with that of States which did not suffer similar losses as the result of the war ; neither would it be just to compare the wealth of Georgia before the war with her wealth since, without giving due consideration to the true cause of the reduction shown by the statistical reports since that time.

The only just terms of comparison, therefore, between Georgia and one of the Northern States, is the progress made during a given period since the close of the war. Even in this comparison, due allowance must be made for the disorganization of the entire labor system, the radical and abrupt change in the relations of labor and capital, and the difficulties attending the readjustment of those elements of production in the face of external interference with the functions of State

Government, as well as the social and business relations of labor and capital.

Notwithstanding all these difficulties, Georgia compares very favorably with the most prosperous of her Northern sisters, in the percentage of increase of wealth for the 7 years ending with 1875.

During that period, the wealth of Georgia increased 52 per cent, while that of Ohio increased only 39 per cent. While Georgia is poor compared with States not injuriously affected by the war, she has taken the lead of those which suffered serious loss by the destruction or depreciation of values, and is contesting closely the ratio of progress with the most prosperous.

Perhaps the best evidence of what may be done under any given set of circumstances, is what has already been done. It is proposed, therefore, to give well-authenticated facts in the history of Georgia production, rather than mere speculative statements of what may be done. The mere opinion of any one man or set of men may be controverted by the opinion of others who are cognizant of the same facts; but when facts established by affidavit of *disinterested* parties are presented, the reader is supplied with the highest possible evidence, except his own personal observation. Results thus established will be hereafter introduced.

#### VARIETY OF PRODUCTS, AGRICULTURAL AND HORTICULTURAL.

There is no single State in the Union with such variety of climate and production as Georgia possesses. There is nothing grown in any of the States except Florida which can not be profitably grown in Georgia. A few tropical fruits grow in Southern Florida which can not be raised in Georgia.

The following products grow successfully in the State—viz. :

*Cereals.*—<sup>1</sup>Corn, Wheat, Oats, Rye, Barley, and Rice—all the cereals—are grown on a large scale except Rye and Barley, which are grown principally for winter and early spring pasturage.

*The Textiles.*—Cotton, Wool, Flax, Hemp, Jute, Ramie, and Silk—all grow well in Georgia, but the culture of Cotton has largely overshadowed the others.

*Sugar, Syrup, and Molasses* are made on a considerable scale in the southern part of this State from tropical Cane, and Sorghum Syrup in the middle and northern sections.

*Tobacco* of very fine quality is grown in any portion of the State, where proper attention is given to it, but it is not extensively cultivated for market, though many farms produce a home supply.

*Peas and Beans* of every description are grown with little difficulty in every county in the State, and what is known as the Cow or Field Pea is a crop of great importance in all the Cotton-belt of the State, both as a source of forage and soil fertilization.

*The Ground Nuts*—Pindars, Goobers, and Chufas—are grown very cheaply, yielding largely, principally to be gathered by hogs.

*Roots and Tubers* of every kind grow finely, and are receiving more attention each succeeding year. Among those principally raised are Sweet and Irish Potatoes, Turnips, Carrots, Parsnips, and Mangel-Wurzel.

An excellent article of *Tea* has been grown in the southeastern part of the State, and succeeds well in other portions.

*Indigo* grows wild in the lower part of the State, and was, at one time, cultivated to some extent, but has been overshadowed by Cotton culture.

*Fruits*.—Every variety of fruit known to the temperate zone succeeds in Georgia, except the Cranberry and Sweet Cherry.

*Vegetables*.—Every variety of Vegetables is cultivated successfully. In the larger portion of the State, fresh Vegetables in great variety may be gathered from the garden throughout the winter.

*Stock*.—There has been but little attention to stock-raising, except in individual instances, in consequence of the absorbing interest felt in Cotton-culture, which has left little time or area for successful stock-raising. The results attained by those who have given attention to it, show that Georgia is admirably adapted to stock of every kind—especially so to Sheep.

*POULTRY*.—Poultry of every kind are raised with perfect success—the Turkey and Duck being found wild in our forests and streams.

**FOREST PRODUCTS.**—In the older parts of the State, much of the finest forests have been destroyed to make room for cultivation, but in portions of Middle and Northern Georgia, there is still an abundant supply of hard-wood lumber, suitable for manufacturing Railroad-Cars, Wagons, and Agricultural Implements, besides a great variety suitable for manufacturing furniture; also forests of soft yellow pine in North-west Georgia; while in Southern Georgia there are millions of acres of magnificent yellow-pine forests suitable for general building purposes, shipbuilding, etc. Within the last few years, Turpentine Plantations have been opened in these forests, for the purpose of manufacturing naval stores. Large quantities of timber and lumber are being annually shipped from Brunswick and Darien, to Northern, European, and South American ports. In the south-eastern portion of the State, the Live Oak—a valuable wood for shipbuilding—abounds.

**GRASSES.**—There are grasses adapted to every section of the State, both for pasturage and hay, surpassing in annual production, under careful culture, the heaviest yield per acre, those portions of the United States in which Hay is a staple crop, as will be shown under the results of Improved Culture, which are to follow.

#### AREAS OF PRODUCTION OF STAPLE CROPS.

While there are general outlines of the production of the various crops, each sometimes crosses the general line under favorable circumstances of soil and altitude.

Corn and Oats are cultivated in every county in the State.

The Wheat area proper extends from the northern border of the State to the general line of division between the Primary and Tertiary, and Primary and Cretaceous formations, which conforms roughly to the falls of the rivers, reaching from the Savannah River above Augusta, following generally the line of the Georgia Railroad to Warrenton, the Macon and Augusta Railroad to Macon, thence north of the line of the South-western Railroad to Butler, and thence to the falls of the Chattahoochee at Columbus. By rather a strange coincidence, the area of Sugar-Cane culture extends from the southern

boundary of the State to the above general limit of the Wheat area, each seeming to be generally controlled by the combination of elevation and soil—the Wheat selecting greater elevation and stiffer soils; the Cane the lower elevation and silicious soils—each occasionally passing over the general line when the above conditions are favorable—Wheat being successfully grown even to the southern boundary, in localities of unusual elevation and on soils having a considerable admixture of clay, or with a clay subsoil. Sorghum covers the same general area as Wheat, but encroaches more uniformly upon the Cane area than does Wheat.

The area of upland Cotton culture proper, reaches from a line on the North, extending from the Savannah River through Athens and Atlanta to the Alabama line, to the Florida line on the South, and to the head of tide-water on the South-east. This area has been practically extended 50 miles further North, by the use of stimulating fertilizers.

The most productive part of the Cotton area is Middle Georgia proper and South-west Georgia.

The area of Sea Island or long staple Cotton proper, extends from the head of tide-water to the ocean, and includes the Islands, being the same as that of lowland Rice. The latter has been very successfully cultivated, however, as far into the interior as Pike County, more than 100 miles from the ocean, under favorable circumstances of alluvial soil susceptible of irrigation, from which it appears that the essential conditions of its successful growth are rather alluvial soil and irrigation, than proximity to the sea or a very low elevation.

Upland Rice is grown on a small scale in all the Cotton-belt proper, and would be grown more extensively if the process of hulling it could be rendered less tedious by the invention of some simple and cheap machine for that purpose.

Clover grows well on any fertile clay or clay-loam soil in the Wheat-belt proper. Lucerne succeeds well on any soil in any locality in the State, if it is made rich and properly prepared.

The Field Pea is grown in every section of the State, but is cultivated principally in Middle and Lower Georgia as a field crop. The usual manner of its culture is between the rows of corn—the peas being planted at the second working of the

corn, and ploughed once, when the corn is cultivated the last time. The peas usually make but little growth until the corn has nearly reached maturity, when they take possession of the soil and make a very rapid growth. It is a very cheap and valuable crop, being valuable as food for man and beast, as well as a fertilizer of the soil—nearly equal in value, as such, to Clover or Lucerne.

Sweet Potatoes are grown in nearly every county in the State (a small portion of North-east Georgia being the exception), and Turnips in all parts—the former succeeding best on sandy soil, the latter on rich sandy loam.

The Irish Potato produces well in every section of the State, but the first crop matures too early in Middle and Lower Georgia to be easily preserved through the following winter. A second crop may be raised in these sections by planting the product of the Spring crop in July or August, and properly mulching them to retain sufficient moisture to cause them to germinate. The second crop, from reproduction, is, in favorable seasons, often as good as the first, and keeps well through the winter. The mountain region of North Georgia is the best adapted to the production of the Irish Potato for market, since, at that elevation, the crop does not mature so early that it may not be easily kept through the winter. They are profitably cultivated on the coast for an early supply of Northern markets.

FRUITS.—The *Apple* succeeds well in every portion of the State where there is an elevation of 400 or 500 feet, and a clay soil or subsoil, both of which are generally found combined in Upper-Middle and Northern Georgia. The trees do not attain such size in Lower-Middle and South-west Georgia as in the Mountain regions, nor do they live so long; but the coloring and flavor of the fruit in the Cotton-belt are superior to that grown in the more elevated regions of the northern part of the State. Near the coast and in many other parts of Southern Georgia, the soil is too sandy and the elevation insufficient to sustain healthy trees.

The *Pear* grows well in every section of the State where proper attention is given to the preparation and fertilization of the soil—the only difficulty being in the prevalence of the blight of the trees. Thomas County, Ga., has, thus far,

almost escaped this scourge. With the exception of a few localities, its culture is confined to Northern and Middle Georgia. The latter section, though producing smaller trees, far surpasses the former in quality of fruit.

One reason for the short *Duration of the Life* of Apple and Pear Trees in Middle and Southern Georgia, is found in the fact, that owing to the long growing season the trees make a second growth in August and September, in which the tendency is more to the production of fruit-buds than wood-buds—the Spring growth being devoted mainly, in a thrifty tree, to the production of wood-buds for the next year's growth. This being the case, trees not unfrequently produce crops of fruit annually for 10 years in Middle and Southern Georgia, while biennial production is the rule farther North. The *annual* fruitage produces an unusual drain upon the vital power of the tree, which requires extraordinary fertilization. The necessity of this has not been recognized generally by fruit-growers, and the necessary food has not been supplied. Trees grown in proximity to dwellings or horse-lots, where they receive an accidental supply of manure, are found to possess unusual longevity.

Middle Georgia and the elevated plateaus of the South-western portion of the State seem to be the home of the *Peach*, which fact needs only to be sufficiently appreciated by the people of those sections to induce them to embark in its culture on a large scale, to make it a prominent source of revenue. Some parties who have cultivated on a sufficient scale to ship by the car-load, have found it a lucrative business. By cultivating the early varieties, we have a monopoly of the markets of the Northern cities for a month, while prices are ranging highest. The same may be said of Pears. Our whole crop of Bartlett and Duchess Pears could be sold in New York before those of Virginia even, are ripe.

*Grapes* grow well in every section of the State, and in sufficient variety for every purpose, though but little attention has thus far been paid to wine-making. The Scuppernong is peculiarly adapted to Middle and Southern Georgia, seldom failing to produce a good crop, never killed by frost, and entirely free from all disease and insect pests. All that it needs is room enough in which to "spread itself."

*Figs* and *Pomegranates* grow admirably in Middle and Southern Georgia, needing no protection in winter except in the upper part of the middle belt.

The *Olive* succeeds well on the coast, and was formerly cultivated, but is now quite abandoned.

The *Pecan* and *English Walnut* succeed well, and are being planted to some extent.

Raspberries, Strawberries, Mulberries, Cherries, and Plums are grown in profusion in every part of the State.

The semi-tropical fruits—*Oranges*, *Lemons*, and *Bananas*—are successfully grown in the southern and coast tiers of Counties.

The *Watermelons* and *Cantaloupes* of portions of Middle Georgia are quite celebrated for their quality, and are becoming a source of considerable revenue. Within a few years, the Watermelon crop of Richmond County has grown to considerable commercial importance. In 1874, 316,450 Melons were sold in or shipped from Augusta. The soil of Richmond and several adjoining counties seems to be peculiarly adapted to the production of Watermelons and Cantaloupes; though they grow to great perfection on sandy soils, in many parts of the State.

In Thomas County may be seen, in addition to all the agricultural productions of the temperate and semi-tropical zones, the Apple, Pear, Peach, Plum, Pomegranate, Fig, Quince, Cherry, Grape, Raspberry, Blackberry, Strawberry, Mulberry, Orange, Lemon, and Banana—all growing within the same orchard. There are few countries thus favored by such a combination of soil and climate.

In less than a score of years, the fruit crop of Georgia will be second only to Cotton in commercial importance, if proper attention is given in aid of natural advantages.

#### RESULTS, SHOWING THE CAPACITY OF GEORGIA SOIL UNDER IMPROVED CULTURE.

In order to illustrate the capacity of the soil of Georgia under proper preparation and fertilization, such as is given in the more densely settled portions of the world, a few results are taken from the Transactions of the State and County Fairs

during the last few years—all on affidavit of disinterested parties.

In 1873, Mr. R. H. Hardaway in Thomas County, produced on upland, 119 bushels of Corn on 1 acre, which yielded a net profit of \$77.17.

This year (1876), Mr. G. J. Drake, of Spalding County, produced 74 bushels of Corn on 1 acre of upland.

In 1873, Mr. S. W. Leak, of Spalding County, produced on 1 acre,  $40\frac{1}{4}$  bushels of Wheat, worth \$80.50; cost, \$14.50—net profit, \$66.00.

To illustrate the fertilizing effects of a Bermuda Grass sod of long standing, the following results obtained by Col. A. J. Lane in Hancock County are given.

The first year after the Bermuda sod was broken, he harvested 1,800 lbs. of Seed-cotton per acre; the second year 2,800 lbs. per acre. The third crop was Corn, manured with Cotton-seed in the usual way and quantity; yield, 65 bushels per acre. The fourth year he harvested 42 bushels of Wheat per acre. Neither the Cotton nor Wheat was fertilized.

Mr. J. F. Madden, this year (1876), produced on 1 acre, in Spalding County, 137 bushels of Oats.

Capt. E. T. Davis, of Thomas County, produced in 1873,  $96\frac{1}{2}$  bushels of rust-proof Oats per acre. After the Oats were harvested, he planted the same land in cotton, and gathered 800 lbs. Seed-cotton per acre.

Mr. T. C. Warthen, of Washington County, produced in 1873, on 1.1125 acres, 6,917 pounds of Seed-cotton, equivalent to 5 bales of 461 pounds each, worth at the average price that year— $17\frac{1}{2}$  cents—\$403.37; which, less the cost—\$148.58—gives a net profit of \$254.79 for the above area—a very small fraction over one acre.

Mr. R. M. Brooks, of Pike County, produced in 1873, on 5 acres of bottom-land, 500 bushels of Rice, at a total cost of \$75.00, giving a net income of \$300.00 on 5 acres.

Mr. John J. Parker, of Thomas County, produced in 1874, on 1 acre,  $694\frac{1}{2}$  gallons of Cane Syrup, worth, at 75 cents per gallon, \$520.87; total cost of production, \$77.50—net profit, \$443.37.

Mr. J. R. Winters, of Cobb County, produced in 1873, on

1.15 acres, 6,575 pounds of dry Clover Hay at the first cutting of second year's crop.

Mr. R. B. Baxter, of Hancock County, harvested at the first cutting, first year's crop, 1872, from land which had been covered with a complete sod of Bermuda Grass for many years until a few years before seeding to clover, 4,862 pounds dry Clover Hay per acre.

Dr. T. P. Janes, of Greene County, produced in 1871, 5 tons of Clover Hay per acre in one season—two cuttings.

Mr. Patrick Long, of Bibb County, harvested in August, 1873, on an acre of land from which he had gathered a crop of Cabbages in June of the same year, 8,646 pounds of native Crab-grass Hay.

Mr. S. W. Leak, of Spalding County, gathered, in the fall of 1873, on an acre of land from which he had harvested in June 40 bushels of Wheat, 10,726 pounds of Pea-Vine Hay. This acre yielded in Wheat a net profit of \$66.00 in June, and the following fall in Pea-Vine Hay, \$233.08—making in one year a net profit from 1 acre of \$299.08.

Mr. L. B. Willis, of Greene County, harvested, in June, 1873, from  $1\frac{1}{2}$  acres of land, 20 bushels of Wheat, and the following October, 27,130 pounds of Corn-Forage. From the Forage he received a net profit per acre of \$159.22.

Mr. R. Peters, Jr., of Gordon County, harvested in 1874, from 3 acres of Lucerne, 4 years old, 14 tons and 200 pounds of Hay, or 9,400 pounds per acre. This land was mowed 4 times—viz., May 17th, July 6th, August 3d, and September 30th.

Dr. W. Moody, of Greene County, harvested at one cutting, from an acre of Oconee River bottom in 1874, 13,953 pounds of Bermuda Grass Hay, at a total cost of \$12.87; worth, at  $1\frac{1}{2}$  cents per pound, \$209.29—a net profit per acre of \$196.42.

Capt. C. W. Howard produced on Lookout Mountain, Walker County, in 1874, on fresh land which cost him 25 cents per acre,  $108\frac{1}{2}$  bushels of very fine Irish Potatoes, with one hoeing and one ploughing, the whole cost of production per acre being \$11.25; net proceeds of  $108\frac{1}{2}$  bushels sold in Atlanta for \$97.25. While this was not a large yield under favorable circumstances, it was a very fine yield for freshly cleared, unmanured land, and the expense incurred in their production, and illustrates the feasibility of Northern Georgia

(a large portion of which equals Lake County, Ohio, for the production of the Irish Potato, without the risks of the northern section) producing potatoes enough to supply all of our markets during the winter. The mountains and valleys of Northern Georgia are admirably adapted to the production of Irish Potatoes and Cabbages, with which our cities have generally been supplied from States north of us.

Mr. John Dyer, of Bibb County, produced in 1873, on 1 acre, at a cost of \$8.00, 398.7 bushels of Sweet Potatoes, which, at 75 cents per bushel, gave a net profit per acre of \$290.92.

Dr. J. S. Lavender, of Pike County, in 1873, produced on 1 acre 1,552 bushels of turnips.

The following illustrates what may be made by diversified farming properly conducted.

At the Fair of the Georgia State Agricultural Society in 1874, a premium of \$50.00 was awarded to Mr. Wiley W. Groover, of Brooks County, for best results from a 2-horse farm. His farm consisted of 126½ acres, on which crops to the value of \$3,258.25 were produced that year. Total cost of production, \$1,045.00; net proceeds, \$2,213.25. No guano or other commercial fertilizers were used on this farm that year, or for 5 years preceding. The crops cultivated were Oats, Corn, Peas, Ground Peas, Sweet Potatoes, Sugar-Cane, and Cotton. The stock reared on the farm that year were not included in the schedule of products.

While the foregoing are exceptional cases, far exceeding the usual results, they serve to illustrate the capacity of Georgia soil when fertilized and properly cultivated, with brains applied under the guidance of Science.

Agriculture was formerly regarded as a mere Art—empiric in all its branches. Now, it is generally recognized in Georgia as an Applied Science. The old prejudice against “book-farming,” as that to which science has been applied is called, is rapidly giving way to enlightened progress. The truths eliminated by scientific research are now eagerly appropriated by the advanced Agriculturists. Our agriculture is on the ascending scale, and the time is not far distant when such results as those given will be common occurrences.

## STOCK-RAISING IN GEORGIA.

The same obstacle which has been in the way of every other diversified interest in Georgia—viz., Cotton culture—has seriously militated against the bestowal of proper attention upon raising Stock. It is true Stock has been, all things considered, successfully raised in every section of Georgia—not because proper attention has been bestowed upon them, but because the climate and vegetation have so favored their growth as to make them profitable in spite of gross neglect.

The results given under the head of "Improved Culture," demonstrate the fact that in all sections of the State abundant forage crops can be raised for every description of Stock.

HORSES AND MULES.—The results of inquiry made of the farmers in 1875, demonstrate the fact that horses and mules can be raised in Georgia at half what they cost when purchased from the West. Not only this, but those raised in Georgia are notoriously more hardy and serviceable than those bred further North.

But little attention has been given to breeding horses and mules, because of the absorbing influence of Cotton culture, which prevented attention to pasture-lands; indeed, Georgia, with the exception of the Northern portion, has always been essentially a *planting* region. The difficulties of the labor problem are now compelling land-owners to look to Stock as a solution to this knotty question, since less hired labor is required, and consequently less expense and vexation attend it than planting.

CATTLE.—There has been but little attention given to the improvement of the breed of Cattle in the State, and insufficient care given even to the common Stock. The whole available force of the larger portion of the State has been engaged in the destruction of grass for the last century, and yet it still grows. One tithe of the effort that has been bestowed upon the destruction of grass would clothe our fields with such a carpet of verdure as would render Georgia the finest Stock region on the globe.

The very large breeds of Cattle are not adapted to the Middle and Southern portions of Georgia, but the smaller

breeds—Jersey, Ayrshire, and Devon—are admirably adapted to all sections of the State. The cross of the Shorthorn on the native Stock does well, where sufficient pasturage is afforded ; but the above breeds all succeed well, either pure or as grades resulting from their cross upon the native.

In much the larger portion of the State, Cattle may subsist upon green food throughout the year. In many sections there are cane swamps which afford excellent natural pasture all winter. Small grain sown early in the fall affords abundant pasturage through the winter, and is not materially injured by being grazed during moderately dry weather. Oats, Rye, and Barley, may be thus pastured, if sown in August or September, and yet produce abundant harvests the following summer. They may be pastured until the middle of February or first of March, according to the latitude and elevation. The heaviest crops of Oats that have been made have generally succeeded winter grazing. Any farm, by proper management, may afford green pasturage for Stock during the larger portion of winter.

Besides the pasturage which small grain crops afford, there is no difficulty in securing abundant crops of cultivated or natural grass for hay or pasture. The Field Pea, which grows so luxuriantly on all of the sandy soils of the Primary, Cretaceous, and Tertiary formations, supplies the place of Clover which thrives on the more elevated clay and clay loams of Middle and Northern Georgia.

The most valuable and reliable grass, and one which is destined to aid largely in revolutionizing the system of agriculture in the Cotton-belt of Georgia, as well as to renovate the worn hills, is the Bermuda—perhaps the most valuable pasture grass in the world, surpassing, in nutritive properties and compactness of sod, the famous Blue Grass of Kentucky, having, according to the analysis of Dr. Ravenel, 14 per cent of the albuminoids. A Bermuda Grass sod, properly managed, will afford excellent pasture for Cattle for 9 months and for sheep the entire year. There will be but little demand for dry forage in Middle and Lower Georgia—such is the mildness of the climate and the character of the spontaneous growth ; but there is no difficulty in supplying excellent dry forage in any desired quantity and at very small cost.

Lucerne, being perennial, is perhaps the most economical for green soiling or for hay, since it can be cut so early in the spring, and so frequently, and ranks so high in nutrition and in soil improvement; but Corn forage, the various Millets, Clover, native Grasses, and Pea-Vine Hay, as well as Bermuda Grass Hay, can all be saved, of excellent quality and in large quantity, for winter use, when necessary.

Cotton-seed, steamed or boiled, and mixed with cut hay and turnips, affords a cheap and excellent food for milch cows.

There is no market, as yet, for milk, except for that produced in the vicinity of cities; but the manufacture of butter is very profitable to the extent of supplying the demand of non-producers in the State. What is known as Wiregrass affords fine spring pasture in the pine forests of Southern Georgia, where the largest herds of cattle and sheep are kept, little more care being taken than to gather them up once a year for marking.

**SHEEP.**—There are few sections of the world in which Sheep can be raised more profitably than in Georgia. When the value of Bermuda Grass is appreciated by the farmers, and the thin and rolling portions of their farms are clothed with it—which seems to have been intended especially for Sheep—Georgia will sustain a sheep for every acre of territory; and 37,000,000 of Sheep would be worth to their owners, in the aggregate, \$37,000,000 net per annum—nearly double the present gross value of the Cotton crop of the State.

Like other Stock, Sheep have, thus far, received very little attention, but have been so favored by climate and vegetation as to pay, even under our neglectful system, an average of 63 per cent per annum net profit on the investment—the average cost of raising a pound of wool in the State being only 6 cents, and the net profit on each pound being  $27\frac{1}{3}$  cents.

Mr. David Ayres, with 3,500 Sheep, of common stock, which range on the wiregrass of Southern Georgia without a shepherd, makes an annual profit of 90 per cent on his investment and labor—the latter consisting only in marking and shearing.

Mr. Robert C. Humber, with the cross of the Merino on the common stock, makes a clear profit per annum of 100 per cent on his investment and labor. His Sheep have a Bermuda Grass pasture, and receive no attention, except regular salting.

The sources of pasturage mentioned under the head of Cattle are equally available for Sheep.

Only a few experiments have been made with soiling Sheep on turnips. Mr. David Dickson herded his Sheep on several acres of turnips, and gathered the next year 4,000 pounds of Seed-cotton per acre—an increase of 3,000 pounds per acre as the effect of folding.

There has never been a fair experiment in sheep-raising in Southern Georgia, combining proper attention to the flock, a judicious selection and crossing, with a reasonable provision for the best development of frame and fleece. There has been but one in North Georgia. Mr. R. Peters has given stock-raising generally very thorough attention with satisfactory results, both as to the stock and the incidental improvement of the soil, the capacity of which for pasturing purposes has increased tenfold in 20 years. Mr. P. is now breeding with most satisfactory results the pure Angora Goat, which will, when properly understood and appreciated, be extensively bred in all the mountain and hill country of the State.

**Hogs.**—The peculiar adaptation of our climate and soil for the production of roots, tubers, and other crops that may be harvested by the Hog, renders the raising of this important food-animal both easy and cheap. The only difficulties in the way of the production of an abundant supply of Pork in Georgia, are found in the ravages of cholera and thieves, and the indisposition of the farmers to plant crops for the especial benefit of the Hog, and to give other proper attention. The removal of the last two obstacles would, to a large extent, if not entirely, remove the first two. With proper attention to the production of such crops as the Field Pea, Ground Pea, Chufa, Sweet Potato, and small grain, with the addition of Clover on soils suited to its growth, Pork can be raised in Georgia as cheaply as in any part of the United States, and almost without the consumption of Corn, except to harden the flesh for a short time before killing.

**POULTRY.**—There are no obstacles to successful Poultry-raising in Georgia, except the indisposition of the people to give proper attention to food and range. With Bermuda Grass for summer and small grain pasture for winter, they can have the necessary green food throughout the year. The Field Pea

and Chufa, with a small admixture of the varieties of small grain will afford ample supply of grain, while there is, with the exception of a few months, an abundant supply of animal food gathered from the range in the form of bugs and worms. There has been some cholera, but this has been generally prevented by equalizing the supply of animal and vegetable food consumed by the fowls throughout the year. This is easily done by supplying grain in spring and summer to neutralize the effects of a surplus of animal food, and meat in winter to supply its deficiency.

Nature has liberally supplied every thing that climate and soil can contribute to successful Stock or Poultry-raising in Georgia. The difficulties to be overcome do not arise from the *country*, but from the *habits of the people*.

#### MANUFACTURING PRODUCTION.

The various manufacturing interests of Georgia are yet in their infancy, but are destined to play no insignificant part in her future destiny.

During the existence of Slavery, the surplus capital and annual net earnings of her people were invested in slaves and land, and the whole energies of the people devoted to primary production. The habits of the people were thus formed, and thought and production directed in a peculiar channel from which it is difficult to divert them.

There has been but little surplus capital for investment within the last decade, in consequence of the want of a proper equilibrium of the productive forces of the State. When this equilibrium is finally adjusted, on such a basis that there will be an annual surplus capital for investment, it will naturally seek manufacturing industry, either for converting our exhaustless beds of ore into metals, or the metals into machinery; or for converting our cotton and wool into yarns or cloth. The value and extent of our mineral wealth will be demonstrated by the Geological Survey now in progress, and attention drawn to the immense water-power—the cheapest in the world—now running waste to the ocean.

There are now 36 Cotton Factories in the State, with 123,

233 spindles and 2,125 looms. These mills consume 50,000 bales annually, or about 10 per cent of the crop of the State.

There are 14 Woollen Factories, with 4,200 spindles and 135 looms.

Nearly all these Factories—Cotton and Woollen—are run by water-power.

There are 1,375 grain-mills, of which 1,262 are run by water. There are in these 1,453 *run* of stones for corn, and 556 for wheat.

There are 734 saw-mills, of which 539 use water-power.

In addition to the above, there are Wagon and Carriage Factories, Iron Foundries and Furnaces, Potteries, Tanneries, Sash and Blind Factories, Turpentine Distilleries, etc.

The following extracts from an address of Hon. E. Steadman, read before the Convention of the Georgia State Agricultural Society which met in Gainesville in August, 1876, set forth the advantages of the South for the manufacture of Cotton. Mr. Steadman has had large experience in manufacturing Cotton in Georgia, and is thoroughly familiar with the subject. The general principles of these extracts apply with almost equal force to other manufactures.

"1. We, having cotton at hand, our factories can be supplied at one cent less per pound than any Northern or European cotton-mill.

"2. By manufacturing a class of goods that are adapted to our home consumption, the advantages over foreign and Northern cotton-mills, in our home market, is equal to one cent per pound on every pound of cotton so manufactured and sold. The two items of purchase of cotton, and sale of fabrics, at home, will give us a profit of two cents per pound upon the cotton so consumed.

"The amount of cotton manufactured with a capital of \$100,000, being 2,286 pounds, on sheetings, per day, amounts to \$45.72, and, per annum, to \$12,616, making, in this item alone, 12½ per cent on the capital invested.

"3. The wages paid to operatives in cotton factories in the Southern States, compared to the New England States, is 34 per cent less.

"4. The cost of water or steam power is much less.

"5. The cost of material for building mills and operatives' houses is much less.

"6. The cost of subsistence is much less.

"7. Our climate is more favorable for the business.

"8. Cotton factories can now be constructed so as to use *seed-cotton*, by the use of a roller-gin (which obviates all the danger from fire incident

to saw-gins), thus saving over factories using bale cotton, in the South,  $12\frac{1}{2}$  to 15 per cent, while goods thus manufactured will be more valuable.

"I claim that cotton-mills built now, with the latest improvements in machinery (in the South), can manufacture goods at a less cost than at the North, leaving out the advantages of cotton and a home market.

"I claim that a cotton factory can be built here, of the same capacity, for less money than in New England—the cost of location and building material being as much less as will pay freight and charges on the machinery. To present my ideas practically, for your consideration, I will give an estimate for a small factory, and its operations for one year, also the data to substantiate the results claimed by me.

"The sum of \$100,000 properly expended in houses, power (water or steam), and improved machinery, would put in operation 4,000 spindles and 100 looms, to manufacture 4-4 sheetings. Such goods are saleable at all seasons of the year, never being out of fashion, and as staple as the cotton from which they are made. They are the plainest goods made by machinery, requiring less skill than many other goods, and their market value is as well known as that of the raw material, hence all can learn the facts, as well as a practical manufacturer. Such a cotton factory would produce, per day, under proper management, 6,000 yards of 4-4 sheetings, now worth  $7\frac{1}{2}$  cents per yard, making the product of the factory \$450 as the gross earnings per day; and per annum, of 300 days, \$135,000.

"The cost of manufacturing that quantity and quality of goods (6,000 yards, or 2,060 pounds of standard sheetings) would be, at this time, as follows—viz.: 2,286 pounds of low middling cotton, worth now  $9\frac{1}{2}$  cents per pound, per day \$217.17.

Wages of 100 men, women, and children, an average of \$1 per day.....	\$100 00
Sundry expenses—viz.: repairs, supplies, etc.....	30 00
Cost of selling the goods, worth \$450, at $7\frac{1}{2}$ per cent.....	33 75
Total gross expenses.....	\$380 93

Multiplied by 300 days (per annum), we have the sum of....114,276 00  
Deducted from the gross earnings, leaves the sum of..... 21,724 00  
as the net earnings per annum, or  $21\frac{1}{2}$  per cent on the capital invested to do the above amount of work—viz.: \$100,000.

"The same amount of money invested in diversified machinery, so as to produce a variety of fabrics, to suit the demands of the community where located, would be proportionately more remunerative, from the fact that some other fabrics, the prices of which not being so universally known, will command a larger price in market, while the cost of manufacture may not be more than that of staple cotton goods.

"The first proof I shall offer is the operations of the Augusta factory. From their published reports, for the six months ending June, 1875, run-

ning 717 looms, they made over 20 per cent on the cost of their factories, which was the sum of \$838,567.39—an average of \$1,169.55 per loom. And the above profits were made after paying all expenses, including an item of interest of \$11,834.04.

“The second fact I will give, is the action of the Eagle and Phoenix Manufacturing Company, of Columbus, who are building an additional factory with the accumulated profits of their factories, after paying good annual dividends to their stockholders. I will take opportunity to refer the *doubting* and *croaking*, who claim that we can not do any thing, to the Presidents and Superintendents of the above manufacturing companies, as samples of what can be done by others. I will also add, that the salaries paid by these companies to their presidents and superintendents (who can not be excelled in point of business capacity) are higher than any railroad, banking, or other corporation in this State. After paying such salaries, these corporations have made and paid to their stockholders larger dividends than any other corporation in this State.”

#### FERTILIZATION.

Georgia soil has shared the fate of that of all new countries. So long as virgin soil is abundant and cheap, no care is taken to perpetuate its virgin fertility. On the contrary, the system formerly pursued in the Atlantic and Gulf States, and now pursued in the new States of the West, seemed to be based upon the impression that the fertility of the soil was inexhaustible.

The thin soils of the Eastern States first reached the point of approximate exhaustion, and there the recuperative system was first adopted. The Tobacco-fields of the Middle Atlantic States next followed, and finally the Cotton-belt, where the principal staple was less exhausting than the cereals and tobacco of their Northern sisters.

The scale has now turned in Georgia, from the exhausting to the restoring process. Her farmers are now building up their waste places by an improved system of agricultural art, guided by the light of applied science. Both natural and artificial Fertilizers are now brought into requisition by the prudent farmer.

The reaction, however, from the exhaustive to the restorative policy was violent, injudicious, and extravagant. Many supposing a liberal application of Commercial Fertilizers all that was necessary to restore their worn fields, expended vast

sums for them, and applied large quantities per acre to their soils under the impression that a restoration of the mineral elements, which had been exhausted by injudicious culture, was all that was necessary.

Experience soon taught, however, that vegetable as well as mineral matter was needed after so many years of clean culture. No question has so occupied the minds of Georgia farmers for the last decade as the principles of fertilization ; nor has their research been in vain. They have rapidly improved in their knowledge of the principles as well as the most advanced practice of plant and soil fertilization.

They are as yet confining their attention mainly to plant fertilization ; but the more advanced and progressive are gradually availing themselves of the numerous resources which the mineral and vegetable kingdoms afford for permanent soil improvement. The rich and abundant deposits of lime and marl, combined with the facility with which various leguminous plants grow in our soil and climate, together with the great accessibility of the sources of supply of the phosphates in South Carolina, render the problem, both of plant and soil fertilization, easy and simple.

Contrary to the generally received opinion, Cotton culture, properly conducted, is less injurious to the soil than any other hoe crop, since the seed and plant are returned to the soil—only the lint being entirely removed. While an average crop of wheat (10 bushels) removes from the farm on which it is grown 32.36 pounds of plant food per acre, embracing nitrogen, potash, lime, magnesia, and phosphoric acid, an average crop of Cotton (450 pounds of Seed Cotton) removes in the lint only 2.75 pounds of the above elements of plant food per acre.

The abundance and accessibility of Marl in the Tertiary and Cretaceous formations of the State, is destined to revolutionize the agriculture of all that section, as well as vastly improve the healthfulness of neighborhoods in the vicinity of swamps and ponds.

The laws require the Inspection and Analysis of all Commercial Fertilizers sold in the State. The Commissioner of Agriculture is authorized to forbid the sale of any fertilizer which does not contain a reasonable amount of plant-food.

The farmers are thus entirely protected from imposition by the sale of spurious articles. For the information and protection of farmers, the Analyses and Commercial Values, calculated from the value of the elements of plant-food actually contained in each brand, are published annually, under the direction of the Commissioner.

Besides the Chemical test by Analysis, a practical soil test of each brand is made under rules prescribed by the Commissioner, by intelligent farmers throughout the State. The results of these tests are reported in writing, and published for the information of the farmers.

Previous to the enforcement of the Inspection Laws, litigation, arising from the refusal of farmers to pay for fertilizers, on the ground that they were valueless (which was sometimes the case), was not uncommon. Now, such cases of litigation are almost unheard of.

Valuable scientific experiments with the different elements of plant-food and various combinations of the same, are conducted by Dr. E. M. Pendleton, Professor of Practical Agriculture in the State College of Agriculture and the Mechanic Arts, on the Experimental Farm connected with the College.

During the season of 1874-5, between September 1st, 1874, and May 1st, 1875, there were 48,648 tons of Commercial Fertilizers inspected for the Georgia market. These, at the average rate of \$51.00 per ton, cost \$2,481,048.

During the season of 1875-6, 56,596 tons were inspected. These cost \$2,640,203.

Through the influence of the Inspection Laws, executed under the direction of the Commissioner of Agriculture, the Fertilizers offered for sale in Georgia in 1875-6 averaged 16 per cent better in *quality* than did those of the previous year; while during the same period there was an average reduction in *price* of 7 per cent.

The use of stimulating Fertilizers has extended the area of Cotton culture about 50 miles further North than before their introduction, by hastening the maturity of the staple, and thus practically lengthening the season.

Nearly half the Commercial Fertilizers purchased in Georgia this year were used for composting with some home material, such as animal manures, marl, muck, and cotton-seed, which

has been found, by repeated experiment, more efficacious than the Commercial Fertilizers alone. The compost system is being more generally adopted each succeeding year, and is materially reducing the cost of fertilization ; and at the same time largely increasing the supply of home manures by stimulating the saving and protection under shelter, of all the manurial resources of the farm.

A cotton-producing region has peculiar advantages in the production of manure, since, for every pound of lint produced, there is necessarily *two* pounds of seed, which is a very valuable article, whether utilized as food for stock or in the manufacture of oil, or used as a Fertilizer.

The average annual crop of Cotton produced in Georgia is 525,000 bales, worth, at present prices, \$21,000,000. In order to produce that amount of lint, 262,500 tons of seed must be produced. These are worth, as a Fertilizer, \$3,499,125.

When the State becomes more densely settled, the oil will generally be expressed and sold, leaving in the hull and cake all the fertilizing elements of the seed for agricultural purposes.

THE END.



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